

Hutchins (Alex.)

The Physiological Reasons Why.



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Salus populi suprema lex.

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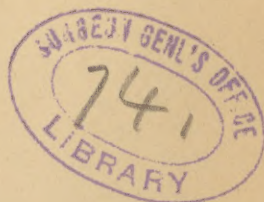
AN ESSAY ON

SCHOOL HYGIENE, WITH REFERENCE TO THE PHYSIOLOGICAL RELATIONS
OF AGE AND SEX TO MENTAL AND PHYSICAL EDUCATION,
to which the Medical Society of the State of New
York awarded the Prize for 1875.

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THE PHYSIOLOGICAL REASONS WHY.

PART I.—THE PROBLEM.

For what there is of excellence in the educational process, credit is to be given, without stint or reservation, to the educators; what is deficient, incomplete, injudicious or harmful, is not so much to be passed to the account of the educators, as to the thoughtlessness, lack of discrimination, unwise ambition and avoidance of responsibility on the part of the parents. The teacher, by the very exercise of his vocation, has always been in advance of public sentiment, and, chafing under restraint, has never been permitted to act up to the full limits of his experience. Holding one object in clear view, he has wrought out the best mode of accomplishing his purpose, within the limits prescribed for him by his patrons. He has all along followed the up-hill track, over which all travel, who have provided a supply in excess of the demand. No more earnest, devoted, patient, sacrificing, absorbed, enthusiastic and intelligent workers gather around any labor, than they who wait on the ministry of teaching.

The plans devised to accomplish the best results with the material, in the shortest time, are their unaided work.

The relations of parent and teacher, employer and employed, bid defiance to the recognized laws of trade. Not only does the latter settle on the end he proposes, and mature his plans to achieve it as far as possible, independent of scrutiny or criticism, but the former hands over his offspring to be dealt with *pro forma*, heedless of end or plans. The consciousness that something is being done, is the self-satisfying assurance when the quarterly bills are audited and paid. The child conforms to a curriculum during the prescribed hours, and goes to waste the remainder of the time, or he is handed over to the educator, body and soul, and school hours and home hours are dictated by another than the parent. Were it not that the school is reckoned among the proprieties of life by the better classes, and held as a relief from the exercise of home-police by the lower classes, the confidence with which these young immortals are

handed over by their natural guardians, in blind, unquestioning, glad submissiveness, to the control and guidance of the teacher, would inspire the belief that the teacher is autocrat or saint, all-powerful or unerring.

There is no uniformity in the educational processes, and it is not pretended that the best ideas have been reached, but the discussions thereon are among educators, one with another, the conflict of clouds driven by the far-off tempests of the upper ether, too far off and of no concern to the counting house or the fireside. Some hard-fisted scientist or rapt visionary, now and then takes the floor to codify or amend; but educator, scientist or visionary are all of a piece to him of the ledger, the counter or the spade; to her of the kitchen, the nursery or the boudoir.

Schools exist, children abound; boys and girls, young men and maidens, must be sent to the schools. Reckoning on the prevailing sentiment of the people, educational portals are thrown open, and there is no misplacing of confidence. They are thronged, they are crowded, they overflow. The poor take advantage of public institutions; fashion and circumstances divide up the remainder. The thrust-out wait and the spoiled pet of fortune are yet to stand far out in the years, and looking back to wonder why they were treated thus and not differently; why the process was so general and not particular; why the individuality was not gathered up instead of merged into the mass; why the father's fatherly and the mother's motherly affection did not discover the tendency and appropriate it fitly.

The process and the parent are not in community of interest for the child. The process is the embodiment of *one* idea, to enable the child's mind to acquire and use knowledge. The parent is, or ought to be, imbued with *two* responsibilities: care for the child's mental training, and anxiety for his bodily vigor. The educational process contemplates so little beyond mental discipline and the acquisition of knowledge, that it is substantially a correct statement that this is all it intends to accomplish. The child's school career is conformity to a curriculum. A heap of well-worn, thumb-ed, and dismembered books, attests the battle and the victory. There are notable exceptions. That the exceptions are notable is the salient fact. The introduction of calisthenic exercises and military drill, and the establishment of gymnasiums have been a concession to outside pressure.

The routine of the teacher, and the indifference of the parent, have been confronted by the hygienist. He has disturbed the one and aroused the other. The private contract between the teacher and the parent is weaker now than formerly. The advent of the social scientist is thrusting the process into the ranks of those questions held to be germane to public economics. The State, as represented by the better qualified, is not simply to deal out charters, but, looking to the broader interests beyond, is to push routine and indifference to one side, and wisely lead the process along by the two-fold nature of the child.

Vigorous health is no less a comfort to the individual than essential to the interests of the State. Whatever

influences depress the physical well-being of the people, not only lessen population, but diminish industry. The State thrives on an industrious, vigorous and increasing population. Good health and good morals live under the same roof, and intelligence is not a very distant neighbor. Good health has a firm grip on all the chances to prosperity, while infirmity of body insecurely slips away from all endeavor. Courage is strong, so far as the body is capable.

The Scientist asserts that the educational process which is to lead up the children into wise and effective maturity, whose intelligence is to carve out the riper civilization, shall not infringe on the conditions needful for the best physical development, because the health of the people is essential to the strength of the State. Being a student of processes as well as results, he is curious and inquisitive into the various modes by which it is proposed to unfold the intellectual capacities, but he demands that, while the body is developing, its best development shall not be interfered with. A reformer as well, he is not to be stopped on his way by interesting speculations on the unity of spirit or the material nature of thought; it is sufficient that as the mind and body travel in company in this world, the education of the one is not to be at the expense of the other. The educational process must take no averages. It must stop short of doing any harm. Physiologist, likewise, he knows that the brain "furnishes conditions necessary for the manifestation of mind,"*

and, as the phenomena alone concern him, it does not matter whether the brain secretes thought or is the instrument of thought; but it is radical with him that the brain is a material part of a material body; that one part of that body may be cultivated at the expense of all the rest; that the highest co-ordinated development of the entire body constitutes the highest physical integrity, and so he insists that the process shall not interfere with this co-ordinated development.

The child is a spiritual and material compound. No compend of moral maxims, no system of training, can prudently ignore this connection of mind and body. Apparently they come into the world together, but the history of their development is not the same. The former is capable of unlimited development, the latter arrives at a prescribed limit, and waste and repair are the conditions of its maturity. The former possesses unlimited possibilities of growth, with a reaching beyond into the unknown; the latter's maturity is a constant tendency to decay, and within a limited period waste exceeds repair, and dissolution follows. The former applies itself to its own culture; the latter is passively obedient to its own organic laws.

This brain, whose function, according to the new terminology, is to cerebrize, furnishes conditions necessary to the manifestations of mind, and these manifestations are made, not by the brain, which furnishes the necessary conditions, but by other parts of the body influenced by the brain. Intelligent action, the adaptation of means to ends, is bodily action in-

* Clinical Lectures on the Principles and Practice of Medicine, by J. A. Bennett, M. D., F. R. S. E., page 142.

spired by the mind. Alienists are finding evidence of the physical causes of insanity.* The body, wisely directed or not, is always the instrument, and, active or at rest, is still the instrument. As the brain is but a portion of the body, dependent on the same nutritive processes by which the rest of the body is nourished, and as the brain furnishes no manifestations of the mind, save as it is connected with the general organism, and as the mind subserves to its purposes all parts of the organism, excepting those connected with organic life, it is more consonant with accuracy of statement to assert that the material nature (i. e., the body) furnishes the conditions necessary for the manifestation of the spiritual. Of course, this statement assigns to the body a position entirely subordinate to the mind, and places the culture of the spiritual on the higher level—a statement altogether in harmony with nature and revelation.

But it is an ordinary inference that, being an instrument, the culture of the body is a means to the better culture of the mind, and, further, that the highest bodily culture is the only condition consistent with the manifestations of the broadest spiritual culture. Let this not be interpreted to mean that bodily strength is a synonym for bodily perfection. The athlete is a monstrosity of muscle. The wiry fingers of the pianist, trained to the most delicate manipulations, assume no supple strength to accomplish other labor. Special de-

velopment neither necessitates nor assumes bodily soundness. The highest bodily culture would include not only the trained capacity to do all that had ever been done as its best, but likewise the trained capacity to do what is capable of being done by the body. It need not be hinted that this is without the limits of human culture, for life is too short for the cultivation and experience that must antecede this training. No one life can wring out all the secrets of any one treasury of effort, whether of body or of mind.

But, for the sake of contrast, this highest bodily culture is set over against that integrity of the body which furnishes the conditions best suited to the manifestations of mind. In one way or another, bodily unsoundness will modify these manifestations. And, still further, all along the upward track of the co-ordinated development of mind and body, the physical peculiarities, whether of organization or disease, modify these manifestations. Legs are essential to running and eyes to seeing, and one born without legs would have as imperfect conception of running as one born blind has of sensible things. That the child acts as his parent does, in many ways, is not the result of imitation, but because of similarity of structure. The serious objection to the intermarriage of relations, is that the physical defects of the parents are intensified in the offspring, and the mental imbecility is again the result of structure.

As the body is the instrument of the mind, and the integrity of the body is essential to the best development of

*Insanity: Its dependence on physical disease, by J. P. Gray, M. D. Transactions of New York State Med. Soc., 1871.
Pathology of Insanity, ditto 1874.

the mind, the educational process that is to command the respectful attention of the scientist, is, on the one hand, to adapt the mental training to the conditions imposed by the peculiarities of the individual, and, on the other, to so conduct the mental training, that it shall not infringe on the conditions best suited to the development of the body.

If a healthy child be subjected to mental training, the educator may properly assume that the child's mind may be fitly and harmoniously disciplined. Mental labor is not only brain work, and notoriously exhausting, but the conditions, under which study is pursued, are not the conditions suited to the best bodily vigor. "Mental fatigue is only what the mind feels of an impaired state of the brain, whose reparative nutrition goes on undisturbed during sleep."* So, if the educator is looking to the best future results, he must be aware that brain work will depress and exhaust the healthiest child, and be skillful to know when rest is needed.

In pressing the claim, that the harmonious development of the body, as the surety of healthful maturity, is not only essential to the best mental discipline, but should be held as of paramount importance, it is asserted that it is the duty of the parent to be watchful, lest the anxiety of the teacher, to properly fulfil his work, hinder or thwart this development. Excellent mental culture may be associated with an infirm body, made so by the conditions under which that culture was acquired, but the comfort of the individual, and the interests of the State, would be en-

hanced, if that same culture were combined with a vigorous body. "Wherever a population is found generally weakly, stunted, scrofulous, there is found a corresponding type of brain, which cannot be trusted to do good work, which is capable more or less of madness, whether solitary or epidemic. It may be very active—it may be very quick at catching at new and grand ideas—all the more quick, perhaps, on account of its own secret *malaise* and self-discontent; but it will be irritable, spasmodic, hysterical. It will be apt to mistake capacity for talk for capacity for action, excitement for earnestness, virulence for force, and, too often, cruelty for justice. It will lose manifold independence, individuality, originality, and when men act, they will act from the consciousness of personal weakness, like sheep rushing over a hedge, leaning against each other, exhorting each other to be brave, and swaying about in mobs and masses."*

Better send a weak child to expand on the frontier and grow up a healthy man, than to college to ripen his mind and destroy his digestion. Better give a ruddy boy the benefit of a common-school discipline and then stop, if it is found that further school life pales his cheek and makes his elasticity droop. Knowledge is good, and mental discipline, that enables one to take advantage of favorable and turn untoward circumstance to the best account, is also good; but excellent mental culture in a weak body is very much more helpless in the conflict of life, than average information in a strong body.

* Health and Education, Rev. Chas. Kingsley, F.L.S., F.G.S., p. 17.

* Paget's Surgical Pathology, p. 28.

School education is conducted during the years in which the body is being developed. The State makes provision that no child need fail of gaining a discipline that the man, if so disposed or circumstanced, can improve on. That there are defects in the system is unquestionable, but it is also true that public sentiment will yet eradicate them by forcing the authorities to recognize the established laws of Hygiene. It is not probable that the great mass of the population will ever be better able, than now, to allow their children to remain in school, after they are old enough to be put in the way of earning their own living. The more favored classes, hereafter as now, are to be brought face to face with this problem of the co-ordinated development of mind and body, and running through a longer period of time.

By the organization of the common school, and by charters to the higher institutions of learning, the State recognizes that the intelligence of the people is essential to its prosperity. No restriction need be placed on the extent of the mental training to which children may be subjected, save as the processes may interfere with the best development of the body. The power of the State to organize and charter, is itself a concession that the State should exercise such an oversight as shall insure proper use of its franchises. As has been shown, neither the teacher nor the parent can exercise impartial judgment. The State must have its laws and regulations framed by scientists, and it is from this class that those must be chosen to whom shall be delegated the authority to see that

these regulations are judiciously enforced.

Something more than medical supervision of schools is needed. Practically, this supervision would be limited to the detection and removal of unhealthful influences. The educational process is the object of the higher criticism, and this process is to be judged by its conformity, not to a theory of education, but to the physical condition of the child. Some well-informed people believe that there are systems of school education to which no child can be righteously subjected—systems, from obedience to which, some exceptional cases may escape unscathed; to which many are utterly unable to conform, and on which others, in a vain endeavor to obey, are wrecked. Of course, no board of education, no principal, no teacher, can be found, at whose doors these evils can be laid without remonstrance. If sin there be, somebody else is the sinner. Mere medical supervision would not meet this issue. The experience of the physician, the training of the physiologist, and familiarity with the work of the educator, are a trinity of accomplishment and skill, alone competent to arbitrate between the remorseless energy of the teacher and the passive indifference of the parent.

But this problem of the co-ordinated development of mind and body will not come under State supervision, nor will it be subjected to any competent or authoritative scrutiny until the importance thereof has been sown, and grown, and blossomed, and fruited in public sentiment. The average of the State is the average of the people. Laws follow, and do not

anticipate public opinion. They are but public opinion formulated. If the child is to be dealt with wisely by the teacher, the parent has first to comprehend the child. When the parent feels the importance of making every step of the child tend towards a healthful maturity, and that "to be is to be well," according to the Roman maxim, when he comprehends that the harmonious development of the body can be interfered with by injudicious processes of mental training, the child's education will not, thenceforth, be unconditionally delegated to another; will cease to be submission to custom, and will assume its proper place as a duty to be conscientiously and intelligently fulfilled. The good sense of the people will then find expression in the State.

Though so little is known of the laws of human production, yet it is recognized that each child is, in his physical organization, by the infinite complexity of transmission, the resultant of his ancestry. This original organization, by the myriad influences that are to affect its development, is to sustain in maturity certain peculiarities, which are to distinguish it from every other. The mental processes, and the mental manifestations, are not only affected, but controlled, by these peculiarities of the physical organization. Indeed, following out the line of modern investigation, it has been boldly asserted by a distinguished alienist, that the extraordinary excellence which has been ascribed to genius is related to special forms of insanity.*

But this problem of the co-ordinated development of mind and body awaits solution, that the educational processes, suited to the conditions imposed by sex, may be satisfactorily differentiated. Public sentiment has been assailed by two criticisms opposite in character. The one asserts that the higher education of woman must be conducted in accordance with the laws of her physical organization, in order that that organization may be harmoniously, and, therefore, best developed. The other claims that her organization interposes no hindrance to her education being conducted in precise identity with the other sex. Many side issues have been discussed with great acerbity, but this statement of the two conflicting opinions touches the essential basis of discussion. It is a question of fact, to be submitted to experience, or to be judged by the facts of science. Experiences differ, and individual cases count for but little. It is too serious a question to be submitted to experience, if the laws of her organization are sufficiently well-defined to decide it in advance of experience. It is a question affecting her development and maturity, regardless alike of her processes of growth and the purposes of her growth. In the following section the essential physiology of woman has been outlined, and the law of her organization traced to its last analysis, furnishing a criterion by which the questions discussed in the succeeding section have been judged.

The acquisition of knowledge, and the discipline of the mind which is to enable it to readily acquire and skillfully use knowledge, though con-

*A. Maudsley, M. D., *Journal of Mental Science*, 1871.

nected as efforts of the mind, are still different mental operations. The possession of knowledge is one thing, and does not necessarily imply that control of the mental powers, which places them at will and at once *en rapport* with new situations, new ideas, and the relations of new facts, which control is mental discipline, and is quite another thing. A disciplined mind must, of necessity, be possessed of some information, but knowledge may be so mixed, incongruous, and un-related, as to be utterly dissociated from anything like mental discipline. Now, as the relation of the educational process to mental and physical education is not a comparison of the excellence of either, but a survey of the development of both, it will be readily perceived that the physical conditions, under which knowledge may be acquired and mental discipline secured, may vary exceedingly.

The skilled educator and the parent are here widely at variance in their comprehension of the situation, and it is unquestionably true that the errors the former commits are oftentimes due to the pressure brought to bear by the unwise demands of the latter. The child, just turned into her teens, glibly rehearsing sines and tangents, and wantonly disporting with levers and fulcrums, while she may be the pride of a boastful circle of friends, must cause the outraged conscience of the educator to toss sleeplessly on its pillow.

Learning by rote, and acquisition by the wholesale, demand a physical strain in extent and continuance far in excess of that proportionate mental and physical development which are

parallel to each other, just so far as they are conformed to a principal common to both, viz: exercise in advance of development arrests growth. Arrested physical development, and imperfect mental discipline, have this in common, that no combination of propitious circumstances can ever make up the growth that has once been dwarfed.

The future is always uncertain; the process of education, mental and physical, should be directed to so prepare the mind and body, that the conditions of the future may be readily complied with, and that the opportunities of the future may be taken advantage of without hindrance. A well-balanced and evenly-organized physique will enable a man to earn his living as a blacksmith, endure hardship and exposure in discovery, or enjoy most completely the benign influences of an easy life, as circumstances, not altogether of his own making, may place him. So a well-disciplined mind is not only an adornment to ordinary life, but may enable one judiciously to administer important trusts, may fit for successful application to science, art or literature, as special qualifications may incline. Early education is not a preparation for a *special* purpose, but for *any* purpose, that *all* efforts may be directed to the best and most enjoyable ends.

This co-ordinated development of mind and body, does not imply that mental education is any contravention of physical laws; it only demands that regard shall be had to these laws. It does not imply that all mental labor is injurious to the body; it asserts that

all such labor should recognize the conditions needful for the bodily vigor. It does not require the disregard of system; it declares that the children, who are the material to be developed, are different one from the other, and that the system shall not be inflexible; that this co-ordinated development cannot be hap-hazard, but must be systematic, adaptive, skilled, watchful, unceasing.

Furthermore, this subordination, in the educational process, of the culture of the mental faculties to the conditions requisite to the harmonious development of the body, is in behalf of the upward culture of the race. It is, in the economy of things, that structure furnishes the conditions for the spiritual manifestations. So, likewise, does structure limit these manifestations. The flesh is lower and subordinate to the spirit, but in this perishable body the immortal spirit is temporarily lodged. The integrity of the body is essential to the most varied usefulness of the spirit. Neglect of the culture of the body is at the expense of the comfort, the liberty and the usefulness of the spirit. The co-ordinated development of mind and body, is not only that the strong may be best endowed, but that the weaker, who are the legitimate result of ancestral transgression of physical law, may be lifted up.

Science shall not dissociate itself from man's relations to his God and his duty to the *whole* brotherhood of man, and avow that knowledge must be increased, though the weaker goes to the wall. The *survival of the

* Building of a Brain, by E. H. Clarke, M. D., p. 47. where reason is assumed to have place in the perpetuation of the fittest.

fittest" may have its place in science, as belonging to the facts of Natural History, but the Christian philanthropist can know no Spartan edict to wipe out the weaker bodies. The body may be weak; ignorance and recklessness may have made it so; but the spirit is in the disposition of Him who gave it. "The citizen is no more responsible for his own weakness than for his own existence. Society—that is, in plain English, we and our ancestors—are responsible for both; and we must fulfil the duty and keep him in life, and if we can, heal, strengthen and develop him to the utmost, and make the best of that which 'fate and our deservings' has given us to deal with."* The operation of the causes that have made infirmity and weakness to be passed into the heritage of this generation can be stopped, and infirmity and weakness, carefully nurtured, can be strengthened into a maturity that shall transmit a stronger and a better race.

It is no valid argument, that the present civilization is intense, and he, who cannot place himself in the van, ignobles and wrecks his life. The man must not be wrecked in the effort to master the civilization. The civilization must be forced back to its place to meet the capacities of man. The civilization is wrong which excites unduly human effort.

The educational process is not responsible for the untoward influences that unsteady life, but, nevertheless, it is unfitted for its task if these influences are not taken into account. Localities may vary these influences, but to some extent they exist every-

* Health and Education, page 7.

where. In the country and the town, they are perverse, but they are incomparably worse in the city. The saying, "give me the first seven years of a child's life and it is indifferent who has the remainder," has been so generally accepted as the universal belief, that to credit any one as the fabricator of the maxim, spoils a dozen other reputations equally the original, but the second seven and the third seven are shore-lined with wrecks.

The instability and the fretfulness of living are to be stamped out in the home. The teacher will have no fair

chance till the parent is willing to listen to the entreaty to protect the child. The practical working of the co-ordinate development of mind and body, in the educational process, can be guided by the general rules which physiology may furnish, but the parent in the home hours, and the teacher in the school-room, must apply these rules to the child, not as a genus, but as an individual. There is here no text for the doctrinaire, but there is the inspiration for duty, anxious for results, the most effective and the most enduring.

PART II.

THE MATERIAL.

SEX.

In the preceding section the relations between the physical and spiritual natures have been outlined; but the next inquiry is into the limitations imposed by sex in the development of these relations. The ideal types of man and woman are so generally recognized as essentially different, not only in physical structure, but in psychical manifestation, that it is pertinent to the studies of the physiologist to inquire into the nature of these differences, and deduce therefrom the principles in accordance with which the best relations between the physical and spiritual natures of each sex can be established. Indeed, in the current discussions of the fertile themes of woman's work and woman's education, appeal has been made to the physiologist, as to the tribunal of last resort, to furnish such a statement of principles, based on the ascertained facts of his science, as shall take this discussion out from the confusing speculations of visionaries

and enthusiasts, into the calmness of scientific investigation.

Before *relation* can be satisfactorily discussed, *condition* must be known; and following out the argument of the previous section, that the body is the instrument of the mind, it remains to inquire how physiology differentiates sex in the human species, and what are the physical causes that preserve the essential peculiarities of the sexes.

The physiology of woman is not satisfactorily summed up in the enumeration of her physical peculiarities. The rehearsal of phenomena is not the *logos* of the phenomena. The order of the phenomena and the cause of the order are essential to a correct appreciation of her physiology. Neither is the distinctive physiology of woman delineated in the statement that the functional activity of her reproductive system modifies the functional activity of her entire organism. For this does not satisfy the con-

ditions of her development; does not explain the phenomena of healthy action, and does not touch the physical causes that regulate the whole procedure.

An investigation instituted to explain the physiological condition of woman, must proceed upon one of two assumptions: either that her physical and psychical phenomena, being in many particulars so widely different from man's, stamp her as a distinct creation, with laws *sui generis*; or that the human species, in development, maturity and decay, is a unit in structural elements, organism and function, and that sex is a modification constantly obedient to physical laws common to the species.

I. At the outset, one striking fact presents itself, viz.: that the structure and processes *necessary to the maintenance of the individual* are a factor common to the human species, and in the male and female individuals of that species are essentially the same.

Not only is there in the female a duplicate with the male for every organ, bone, muscle, nerve, and tissue, whose vital properties and functions are in exact correspondence, but the histogenetic elements of which these are composed are no fewer and no more than in the male. Respiration, assimilation, secretion, circulation and excretion in each are identical in kind, and operate in accordance with laws common to both. The special senses, sight, smell, hearing, taste and touch, essential to protection and maintenance, correspond exactly in structure, size, sensitiveness and power. Life is maintained through

the appropriation of the same kinds of aliment, and they exist together under the most diverse climatic influences.

Whatever differences exist in the female, in all that is essential to the maintenance of the individual, are in extent of structure and intensity of function, and do not trench upon the absolute accuracy of the statement that in all that is thus essential, there is in both absolute identity in kind. There is a difference in contour, but contour is only a result of the grouping of structures. The breadth of her pelvis may make her run queerly, the only ungraceful movement she does make, as some one has said; but the bones and the muscles, and the mode of their action, are the same as in the male.* She may have a generally thinner skin, a relatively larger cerebellum, a lesser weight of heart and kidneys, a smaller brain case, a quicker pulse and higher temperature than man; but the scalpel, the microscope, experimental physiology and chemical re-agents can discover in her no difference from man, in the quality of the structure and processes needful for their common maintenance.

If structure and processes are identical in kind, identity in kind is to be predicated of the stimulating and coordinating force.

Structure, function and force being identical in kind, identity of purpose (the maintenance of the individual) being constant, identity of type, for all individuals of the species, is to be assumed. In other words, the main-

*An elaborate exposition of the external physical peculiarities of woman, as compared with man, with a comparative analysis of her intellectual and emotional characteristics, is to be found in Elliotson's *Physiology*, pp. 609 to 707.

tenance of all individuals of the human species is provided for by a typical structure with typical functions, controlled by a typical force.

Although the male and female hold in common so much that is in precise identity, yet each possesses certain characteristics, peculiar to each, distinguishing each, and unfailingly recognizable in all periods of their history, irrespective of race, location, external influence and special civilization; and these persistent characteristics are, in every particular, a modification in size and intensity of the typical organism instituted for the maintenance of the individual, and common to all individuals of the species. The formulated proposition is that structure, function and force, being identical in kind, with constant modifications from a typical standard, identity of modifying cause, affecting development and maturity, is to be assumed.

By reversion of argument, the constancy of a modifying cause, with constancy of results, argues a common type.

From these propositions it is argued that the physical peculiarities characteristic of the male and female individuals of the human species constant to each, are to be referred to the operation of some constant cause, not essential to the maintenance of the individual, and this affecting cause must be resident in each individual.

II. *The continuance of the species* is a capacity of the species, and the provisions therefor are lodged in two individuals of the species. In some low forms of life, the entire reproductive apparatus is contained in each indi-

vidual, and up through every grade its structure is elaborated, and its functions are specialized with the refinement of the species.

The organs necessary for the fulfillment of this capacity, in their distribution among two individuals, are constant in these individuals, and distinguish them as male and female.

Through all the higher grades of the animal creation, the distribution of the reproductive apparatus carries with it certain modifications of development in the nutritive system, the same in kind and analogous in manifestation to the modifications which accompany this distribution in the human species.

The capacity for the continuance of the species is, in no wise, essential to the maintenance of the individual. The facts of experience show that long life and continued health, are preserved in those individuals whose reproductive apparatus has never been aroused into its highest possible functional activities, and the facts of experience also show, that arrest of development, with the functional activity held in abeyance, or reduced to its minimum, is not inconsistent with the integrity of the nutritive system. This involves the conception that the typical structure has reference to the maintenance of the individual, and is the constant factor, irrespective of the continuance of the species, and irrespective of the quietude or excitement of the functional activities peculiar to the reproductive apparatus.

The reproductive system is the only system not the same in all individuals of the human species. The distribution is uniformly the same, as the rare

cases of more or less complete hermaphroditism belong to the class of monsters. The distribution in the reproductive system is a separation of the several parts of one organism, and not two modifications of analogous organs with special functions.

Therefore, without taking into account the CAUSE of sex, and considering alone the FACTS of sex, it is to be assumed that the reproductive system is the constant cause operating to produce the physical peculiarities characteristic of the male and female individuals of the human species.

III. The distribution of the organs of reproduction is *unequal* in the male and female.

While the formation of the ovum and the stimulation of the ovum are the elements essential to reproduction, yet in the human species the structures and the diversity of function which belongs to them, by means of which the whole process of reproduction is developed, rise to an elaborateness and complexity that has no parallel in similar organs in any other of the animal creation.

This inequality of distribution is manifest in the structures themselves (*a*), their location (*b*), the difference in effect on the nutritive system in their normal condition (*c*), the special duties required of them (*d*), the special character of their activity (*e*), the changes wrought in their highest development (*f*), and in the period of their active operation (*g*).

(*a*.) High organization, their functions characterized by activity, belongs to the essential portions of the reproductive apparatus distributed to the

male, and of the subsidiary apparatus he has but a small portion; while vast preponderance of the subsidiary apparatus is given to the female, characterized, in the main, by low organization and passivity of function.

(*b*.) In the male, the distribution is external and in the nature of an appendage; in the female, it is altogether internal, and, structurally, an integral portion of her organism.

(*c*.) In the male, the normal condition intensifies the general nutritive operations; in the female, while the normal condition leaves the system at rest, the activity of its functional operations depresses the general nutritive processes.

(*d*.) In the male, the duty required is the deposit of a secretion appropriate to the stimulation of the ovum; the reproductive system of the female elaborates the germ, develops it up to its capacity for an independent existence, and provides for a certain period of its after-sustenance.

(*e*.) The functional process special to the male is a power capable of but one activity, and that only at its highest, held in abeyance, except under certain stimulation, and prompt in obedience thereto; in the female, the process is vital, periodical, involuntary and complex; subject to periods of rest and activity in one state, and yet capable of substituting that activity for another vastly different and more energetic.

(*f*.) The highest possible functional activity of the reproductive apparatus in the male involves no change of structure therein; in the female, this activity is accompanied by nutritive changes of development and involu-

tion altogether exceptional in character and extent.

(g.) In the male, the period during which the activity of his reproductive apparatus is possible is long continued; in the female, this period has a definite limitation.

The inferior distribution of the reproductive apparatus in the male, its independence structurally of his organism, the moderate effects of its normal activity on his nutritive system, the limited scope of the duties required of it in the reproductive process, the singleness of its activity without consequent change of structure, and the evenness of its possible activity through so long a period of his natural existence, compel the physiological inference that the reproductive system in the male individual of the human species affects his nutritive system to a comparatively slight degree, *and, therefore, the male individual of the human species represents the typical organism for the maintenance of the individual, and man in his best physical estate is to be taken as the type.*

On the other hand, the preponderance of the distribution of the reproductive apparatus in the female, its close affiliation with her organic structure, the depressing character of its functional activity, the extraordinary energy of the duties of which it is capable, the complex character of its activities, the extensive structural changes it undergoes, the periodicity and limitations in the exercise of its functions, make it physiologically inferential that the reproductive system in the female individual of the human species is the constant cause, modify-

ing her physical structure from the typical organism for the maintenance of the individual, *and woman, in the utmost integrity of her organism, and in her most harmonious development of structure, is, so far as concerns the maintenance of the individual, a modification of the type.*

This physiological inference receives confirmation from the observed facts of the influence of the ordinary functions of the reproductive system on the organism common to the species. The establishment of puberty in the female, not only signalizes an increased death-rate in her over the male (1.25 to 1), but it is frequently associated with the occurrence of anaemia, from causes difficult to recognize, "when there has been no loss of blood, no deficiency in alimentary supplies, and no unusual expenditure of blood plasma."* It has been found as the result of extended experiments that during menstruation the process of nutrition slackens, the pulse is diminished in force and frequency, the temperature is decreased half a degree, and that the amount of urea eliminated is diminished over twenty per cent. These changes commence to manifest themselves one or two days before the appearance of the catamenia, and disappear a few days after their cessation.† After menstruation, "the brain and nervous system, the stomach and intestinal canal, are exposed to new and energetic influences, which, when abnormal, may give rise to disease, or the phenomena of disease, in these organs."‡ "Whether the due perform-

* A Treatise on the Principles of Practice of Medicine. A. Flint, M. D., p. 62.

† Dr. Rabuteau, *Gazette Hebdomadaire*, July 6, 1870.

‡ Diseases of Women. F. Churchill, M. D., P. C. D., M. R. I. A., p. 23.

ance of the functions of these organs adds to the health of the individual or not, it is quite clear that, during the period of activity of the sexual system, its derangements are most injurious, and that in proportion to the extent of the mischief.”*

It is sound doctrine, that, as so great modifications are induced by disease of these organs, it is proper to infer that they are the result of a susceptibility, induced by some constant modification, related to the healthful exercise of functions. So, without accepting as a necessary and constant fact, the saying of Michelet, “*Que la femme est une malade,*” this physiological inference is again confirmed by the modifications of the common organism induced by menstrual disorder, and by disease of the reproductive organs. Clinical observation may determine the numerical ratio of certain diseases in the male and female, but deductions from the observed facts may be helpless to say why certain diseases should occur in one more often than in the other. It may be clearly shown why she should be more subject to chorea, but why should she possess so great an immunity from such a diasthetic condition as gout, is a mystery.† But the frightful list of neuroses which are intimately connected with menstrual disorder,‡ and the disorders connected invariably with uterine diseases, are matters of ordinary clinical experience, and crowd the pages of the specialist’s descriptions. “Uterine diseases develop so great a number of symptoms

called nervous or hysterical. The most varied forms of mental alienation, the most curious hyperæsthesias and anæsthesias of certain parts of the body, the most persistent neuralgias and spasmodic contractions, spreading often to numerous groups of muscles, claim if not always, at least very frequently, for sole cause, an affection of the womb.”*

But, leaving as beyond question the statement that at and after the establishment of puberty, the reproductive system of itself, and by its normal and disordered functional activities, does operate as the constant cause giving rise to the physical peculiarities characteristic of the female, yet it is essential to inquire how the reproductive system can effect the marked differences that exist in the sexes *before* that period. It cannot be denied that many of the earliest developments of the child are such as belong to its sex. Not only is it the rule that girls speak earlier and more perfectly than boys, but the tastes, habits and manners are such as are characteristic of their sex in maturity.

To meet this inquiry, it is to be remarked that there is no structure in the human organism, which ultimately attains development, which is not to be found in a more or less rudimentary state at the end of foetal life. Maturity is but full development. All structure is commenced *in utero*, though function may not be established. As there are *epochs* in foetal organization, so there are *periods* in development.

Again, it is to be remarked, that the rudimentary is but the initial stage of

* Diseases of Women. F. Churchill, M. D., P. C. D., M. R. I. A., p. 25.

† Flint’s Practice, p. 843.

‡ Obstetrical Journal of Great Britain and Ireland, January, 1874, p. 134.

* Scanzoni, p. 33.

perfected growth. In organic life there is no period of rest. There is perpetual change. Development or decay mark every stage of organic life. Arrest of development is death or deformity. From the earliest organization of the dental pulp to the shrinking of the alveolar process in the whitened head of age, the renewal of tissue is a substitution of new for old.

Not less applicable are these physiological maxims to the organization and development of the reproductive system. The continuance of the species is provided for long before the child is born that is to be the mother of the coming race. Provision is made for its lodgment; the general contour is modified to suit the emergencies of the future years; such depressions in the development of the rest of the organism are provided for as shall insure harmony of action, when its maturity shall be reached, and its activity begun; waste and repair of its substance date from its earliest inception; and renewal upon renewal occurs again and again during the long quiet of its development. And so, what is true of the processes of the organic life of the reproductive system in its perfected organism is measurably true of all the antecedent stages of its history.*

The sum of these physiological conclusions is that there is a typical structure common to the human species for the maintenance of the indi-

vidual; that the physical peculiarities, characteristic of the male and female individuals of the human species, are the result of the influence of the reproductive system on the common organism, and that the reproductive system is for the continuance of the species and not necessary to the maintenance of the individual; that the distribution of the reproductive apparatus is so markedly unequal in structure and aggregate of function, slight in the male and preponderating in the female, energizing in the one and depressing in the other, that man is to be regarded as representing the typical standard of nutrition in the human species, and woman from her original organization, through the whole history of her development and maturity, in the structure and operation of her organism, as a modification of the typical standard of nutrition, *by reason of there being associated with the entire history of her nutritive organization and development, the organization and development of her reproductive system.*

IV. The general fact being stated, that the physical characteristics of woman are the result of the influence of the development and operation of the reproductive system on the nutritive system, typical to the species, the next inquiry in the investigation of her physiologic condition must include the principles in accordance with which these modifications are affected.

(a.) The lower the descent in the scale of the animal series, the nearer the approach to that state of *homogeneousness*, which is the typical attribute of inorganic bodies, and wherein there

* See the Genesis of Woman, by Dr. E. Van Der Walke, Popular Science Monthly, No. xxvii, wherein he takes the ground that the crisis in female life is not functional, but structural. The sexual organism is formative and not paroxysmal. He argues, therefore, that too much stress is laid on the crisis of puberty, to the neglect of the needful care up to puberty.

is no distinction either of tissues or organs; on the other hand, in the ascending scale, there is a "differentiation of the body into organic systems, and of these again into separate and more individualized sections,"* until the principle of *specialization* is carried to its highest degree in the organism of the human species.

This upward series is characterized, not by greater bulk, but by the acquisition of new forms and structures.† Above form and structure, is the capacity for manifold appliance. The hand of the ape is a lower organization than the hand of man, by reason of its limited capacity of appliance. As has been shown, the elemental structure is distributed throughout the entire organism; and the different adaptations of the various structures, while they act in obedience to laws vital to themselves, are dependent on the motive power applied to the general organism. The reproductive apparatus is nourished by the same fluid, stimulated by the same force, carried by the same organs, emanating from the same centre, that stimulate and vitalize the rest of the organism.

Admitting the lower grade of some portions of the reproductive system, yet its processes of growth and repair are affected by the laws that govern the general nutrition. "An eliminative function is to a certain extent brought about by all the processes of growth, and there can be no change, however limited, that is not necessarily associated with a general one in

the system at large."* Every organ, to secure its proper development and perform its appropriate functions, must have a due proportion of nutrition.

It thus appears that the female organization, by its additional structures possessed of special capabilities, and in similarly intimate and necessary dependence on the general nutrition, advances by so much in the specialization of structure, and is the higher organization. Higher organization involves essentially a modification of type.

(b.) The physical condition of woman being characterized by higher organization, it remains to inquire how the general nutrition is affected by the increased specialization of structure.

While the later development of the nervous system renders it highly probable that it has but a slight and indirect influence in the development of structure (this process being carried on in accordance with certain special, inherent, vital powers), yet, in addition to the recognized phenomena of healthy action, the disturbances consequent on pathological change are sufficiently suggestive of the extensive influence exerted by the nervous system in harmonizing and regulating the functions. The processes that in health are hidden become patent in disease. That which promotes smoothness and repose in the normal state, in abnormal conditions is the agent of widespread and tumultuous anarchy. In one way

* Principles of Comparative Physiology. By W. P. Carpenter, M.D., F.R.S., F.G.S., § 18.

† Paget's Surgical Pathology, p. 26.

‡ Bennett's Practice of Medicine, p. 135, following the idea of Trevianus, viz.: that each single part of the body, in respect to its nutrition, stands to the whole body in the relation of an excreted substance. Ditto, p. 154 for examples.

and another all the tissues, no matter what their distribution, seem to be influenced by the nervous force in their nutrition.

It does not concern the present argument to discriminate between or inquire into the comparative predominance of the motor or sensitive nerve fibres of the cerebro-spinal system, or of the ganglionic system, in the processes of organic and animal life. For, "however much we may differentiate the nervous and nutritive functions, the fact still holds that they are inseparably connected."* Some nervous force is exercised in the nutrition of all the parts, in or near which nerves are distributed, in accordance with the general law, "that the interdependence of parts augments with their development; for high organization consists not in mere multiplication or diversity of independent parts, but in the intimate combination of many parts in mutual maintenance.†

In the higher classes of the animal creation, the dependence of independent parts of the organism, in their varying activities, is provided for by the controlling and harmonizing influence of a central power. The elaborate structure of the cerebro-spinal and ganglionic system is the source and medium of that power in the human species, and the general law of the distribution of force is equally applicable to the higher organization of the woman. The amount of the nervous force is dependent on the integrity of the nervous system. The manifestation of the force varies with the distribution of the system.

Strength is dependent on concentration; delicacy on diversity of distribution. The nervous system acts on organic life as a co-ordinator. The more complex the organism, the more complex is the interdependence of the various organs, and the delicacy of the interdependence varies with the extent of the distribution of the force.

It has already been made out that the structural characteristics of woman are due to the co-ordination of her reproductive and nutritive systems in organization and development, and the argument for her higher organization, with its consequent more delicate balance in mutual maintenance, is equally explanatory of her functional characteristics.

(c.) It has been shown that the reproductive system is in no sense essential to the nutritive; that it is entirely dependent on the nutritive system, and that its operations connected with the operations of the general organism through the medium of the nervous system, under the law of the distribution of force, render more delicate the balance of the nutritive functions. The case is complicated by the well-ascertained and strictly accurate physiological fact of the *antagonism* between the nutritive and reproductive systems. Though a matter of ordinary clinical experience, the general law has been well stated by Carpenter, "that the development of the individual and the reproduction of the species stand in an inverse relation to each other,"* and again, "the generative apparatus derives the materials of its operations through the nutritive system, and is entirely

* See Dr. Brown-Sequard's Lowell Lectures, No. 6, 1874.

† Paget, p 53.

*Carpenter's Physiology, § 848.

dependent on it for the continuance of its activity. If, therefore, the generative activity be excessive, it will necessarily draw from the fabric at large some portion of the aliment destined for *its* maintenance. It may be universally observed that where the nutritive functions are particularly active in supporting the *individual*, the reproductive system is in a corresponding degree undeveloped, and *vice versa*."*

Generalizing again, the more specialized the organism, the higher the organization; the more specialized, the greater the need of a central co-ordinating power; the more antagonistic the specialized functions, the more delicately balanced the distributed force, and the more easily disturbed.

From the arguments and principles thus far adduced, the physiological condition of woman has been shown to be a *higher organization, the resultant of the co-incident organization and development of her more numerous and specialized structures, the maximum resistance of the sum of whose nutritive processes is lowered by the wider distribution of the nerve power, by which the functional operations of her organism are controlled and harmonized.*

V. By the foregoing argument it has been made out that the maximum resistance of the nutritive processes of woman is lessened by the co-ordination therewith of a system whose functional activities are *antagonistic* to her nutrition. The case is still further complicated by the physiological fact that these functional activities are

not only *antagonistic* but *not constant*. The reproductive system, operating under conditions vital to itself, has an ordinary activity rhythmical to itself, but irregular as to the constancy of the nutritive processes, and therefore irregularly disturbing the balance of the co-ordination of function. But the occasional display of its highest functional activities produces a disturbance vastly more profound, which not only modifies the nutritive processes, but affects to a still larger degree the *results* of those processes.

But the argument thus far is incomplete. It alleges, by the collocation of physiological facts and inferences, that woman is constitutionally different from man in the maximum of her resistance, a scientific no less than a popularly-recognized fact; a difference recognizable irrespective of race, nationality, clime, or civilization.

Before her special relations can be submitted to intelligent investigation, the physiological law of her economy must be inquired into.

What is the physiological and structural law in accordance with which is produced the *uniformity* of the physical characteristics of woman?

It has been found that histogenetic element, tissue, and organ, necessary for the maintenance of the species, are precisely identical in kind in the male and female individuals. "The essential character of any tissue or organ, being maintained up to the limits of healthy (co-ordinate) growth, function increases with substance (quantity)."*

In animals where muscular movements are more simple, as in fishes, the spinal cord is slighter, and the grey

* Carpenter's Comparative Physiology, § 92.

* Paget.

matter, as well as the ganglionic cells, is much more scanty, as fewer combinations of movement are required.* The inference is, that the nervous system being so nearly identical in quantity in man and woman, that similar combinations of movement are required with her as with him, and that the system being the same, the force is an equivalent. Extent of system and equivalency of force argue similar capacity for results.

The complete integrity of the physical organism involves the conception of an amount of nervous force exactly suited to the demands of the nutritive system, accurately adjusted, *and constant in action.*

The antagonism of the generative and nutritive systems involves the necessary conception of the disturbance of a co-ordinating force.

The nervous force applied to the purposes of the nutritive system (neuro-muscular, organic) not controlled by the Will, is constantly in operation. The special development and periodical activity of the reproductive system, independent of the nutritive, and yet influencing it, because itself influenced by the force which ministers to its support, begets the conception that if the nutritive system of the female were in quantity up to the typical standard of the species, the nervous force necessary for the development and functional activity of the reproductive system, must be under the control of the Will; or that, at certain periods in the life of the woman, and particularly during the intermission of the functional activities, a por-

tion of the nervous force is dormant; or there must be an excess of nutritive activity at all times except during that functional activity. All these conceptions are untrue.

The final conception appears that in woman such a share of the typical nervous force is withdrawn from the functional activities of her nutritive system, as is requisite to serve the purposes of the development and support of her reproductive apparatus and the fulfilment of the energies vital to itself.

The integrity of the nervous system being dependent on the harmonious action of all the organs which it influences, and is, in turn, influenced by, disturbance in the functions of one influences the integrity of every other "It is a fundamental law of the distribution of the vital powers, that when they are increased in one part, they are diminished in all the rest of the living economy; that the sum is never augmented, but that they are necessarily transported from one organ to another, and, therefore, to increase the powers of one organ, it is absolutely necessary that they should be diminished in another."*

It admits then of no question that in a congeries of connected organs, any one of which is subjected to periodical or irregular action, the connected organs must undergo some modification of functional irregularity, not only during that period, but during the time necessary for the recovery of the equilibrium which it lost by the action of the disturbing force. Of course, it will be readily perceived that these periodical func-

* Prof. Schroeder Van Der Kolk on the Spinal Cord and Medulla Oblongata, pp. 64 and 80. See also p. 66.

* Bichat, Physical Researches on Life and Death,

tions, if performed in exact accordance with the vital laws governing the structure of the organ, would reduce to its minimum the disturbance of the regular and unintermitted functions of the associated organs, provided that these functions were performed in perfect harmony with the vital laws governing the special structures; but, nevertheless, it cannot fail to be recognized that the minimum of disturbance must *always hold*, and that the amount of the disturbance must vary directly with the integrity of the associated functions. And this reasoning can only proceed on the assumption that the amount of nervous force in the ideal being of the human species is just adequate to the co-ordination and direction of its nutritive system, considered as for its own maintenance; and that the reproductive system designed for the continuance of the species, both in respect to the unequal distribution of its necessary structures in two individuals of the species, and in respect to the proportionate activity of its functions, in either part of its distribution, disturbs, to that degree, the harmony of the nervous and nutritive systems.

In the structural process to provide for the development, support and special energies of the reproductive system in woman, one of two modes had to be provided. Given to her nutritive system a development and activity similar to man's, the additional nervous force required to satisfy the demands of the reproductive system, for the perfected display of all its possible energies, would have at once necessitated proportionate increase of size in the main trunks of

the organs conveying the nervous force, no less than a proportionate increase in the nervous centres themselves. The harmonious structure of the human form would have demanded proportionate increase of her entire body; and woman, instead of being the "lesser man," the historic fact, long before Tennyson penned it, the horrible suggestion of the giant woman looms up from out the argument.

But give to her a sum of nervous force equivalent to man's, and so distribute it that it shall serve the purposes of organic and animal life, with her as with man, as well as serve the purposes for which the reproductive system was established, and her lesser size, the less intensity of her animal functions, the marked susceptibility of her nervous system,* which are the historic facts of her economy, are submitted to a rational explanation.

Therefore, the cause of the physical characteristics of woman is to be found in her higher organization, from the multiplicity of structure, and her more widely-distributed nervous force, with its consequently more delicately-balanced character; the aggregate of the distributed nerve-force being the typical sum needful for the maintenance of the individual.

VI. The discussion thus far has been restricted to the *physical* characteris-

* "The greater the amount of nervous force, the less the excitability there is, and *vice versa*, the greater the excitability the less amount of nervous force. There is, therefore, something quite distinct in these two things—excitability and nerve force. This property of excitation is nothing but the power to receive an excitation. Persons who are extremely strong will not generally be moved by excitation; they will judge what it is; but they will remain calm under it. While, on the contrary, persons whose nervous system is weak, and who have little nerve force, will react under any excitation, however slight, without giving the mind time to think what the excitation is."—Dr. Brown-Sequard, *Lowell Lectures*, 1874, No. 2.

tics of woman. If there are any essential distinctions in the mental and moral nature, occasioned by sexual differences, satisfactory evidence has yet to be produced; and, though this discussion is limited to the physiological status, in view of what has been urged, it is to be asserted that sexual differences are of the material nature only. For, if the species be regarded as a physical and psychical combination, and the accepted facts of the relation between the nervo-muscular system on the one hand, and the emotions, intelligence and the will on the other, be considered; and if it be conceded that the material nature is but the instrument for the development of the immaterial nature; and, also, that physical conditions modify psychical states, and that psychical states do influence physical conditions; and that the nervous system, emanating from the brain, is the medium of this interchange; it follows, at least, that the harmonious action of the nutritive system is essential to the best psychical operations. It follows, likewise, that disturbance, from whatever cause, of this harmony of action in the nutritive system, must affect the psychical operations. In short, that the integrity of the psychical operations must vary directly with the integrity of the nutritive system. Add to this, that while the reproductive system is, in no sense, essential to the maintenance of the individual, the consideration that the psychical development is influenced by the mental and moral discipline, evoked by all that is involved in the continuance of the species (a discipline that would be entirely unknown were the maintenance of the

individual alone provided for), and that this development is in direct relation to the conditions demanded by the special distribution of the reproductive apparatus, and it will follow, not only that the unequal distribution of the reproductive system varies the conditions of psychical development, but that the special psychical development must, in its own way, affect, in a peculiar manner, the physical organism with which it is associated.

To revert again to the law of distribution: concentration intensifies and distribution weakens. The same force exerted over a multiplicity of organs not only weakens its intensity in each, and shortens the period of resistance, but demands for each a greater sensitiveness, and necessitates an increased liability to derangement. Even though the rhythmical activity of the reproductive system be understood only as a fact of experience, yet, as such a fact, on this reasoning, it is clear that the disturbance of the nervous system thereby induced, by all other analogies of the human economy, must affect to an extent more or less appreciable, the functional integrity of all the associated organs, which, in the case of woman, means her entire being. Not alone in common with man in organic disease, and more or less extreme functional disorder, when the general functions of animal life participate in sympathy, and the steadiness of judgment and the calmness of the moral sense are swayed, but the *perturbations*, which are the uniformity of her being, are the key-note to the music wherein is expressed the harmony of woman's physical and spiritual life.

VII. Reverting again to the law of growth, viz.: that where the nutritive functions are particularly active in supporting the *individual*, the reproductive system is in a corresponding degree undeveloped, and *vice versa*, the converse of this law suggests an element of great importance in confirmation of the principle, the truth of which this argument is endeavoring to establish.

It is ordinarily held that woman develops somewhat earlier than man, and the inference is that she must grow more quickly. The statement is unquestionably correct, if her earlier development be made a standard of comparison with her full development. From the age of puberty there is a marked difference in the development of girls and boys, as respects *suddenness and speed*. There is an equally marked difference in the *continuance and extent* of this development during the years succeeding puberty. The girl develops into the woman and stops. The boy makes slower progress into manhood and reaches a greater development.

What is the physiological explanation of this constant fact?

The development that occurs between infancy and puberty is vastly in excess of the development that occurs between puberty and the period of mature growth. During this period the growth of the healthy child is altogether symmetrical. It includes the period of the most rapid increase of substance. Rapid growth that occurs after that period is usually at the expense of the general vigor. What are the precise vital conditions *essential* to the establishment of puberty, is not known. But, in view of the general law

of relation between the support of the individual and the development of the reproductive system, it is clear that the establishment of puberty is *associated* with a nutritive epoch. "Although disorder of the menstrual function is one of the most common phenomena of female youth, yet it is, undoubtedly, to be looked upon more frequently as a symptom of general defective nutrition (and especially of an impoverished condition of the blood) than as itself constituting a disease."* "It is strange to assume that the generative function should come into play before the nutritive processes so essential to the welfare of the individual have been perfectly consolidated. Such an assumption is opposed to the spirit of all sound physiological reasoning. There can be no more fertile cause of delicacy than the premature approach of menstruation. Such an event often engenders disease by drawing off the vascular and nervous energy, so essential to the consolidation of the functions of nutrition and growth."†

Either the age of puberty indicates such a line of demarcation between the rapid growth of childhood and the slower development of adolescence, that the reproductive system is enabled to assert itself, or, that the reproductive system has, at that period, attained such a development as enables it to oppose itself to the nutritive processes. The former hypothesis is probably correct, but the argument is concerned only with these two general facts, viz.: that childhood, in both sexes, comes up to the period of puberty in

* Carpenter's Physiology, § 979.

† F. T. Porter, L. R. C. S. I., in the *Obstetrical Journal*, April, 1874, p. 55.

similar development, and that, from that period, there is in the two a divergence in the nutritive processes. The man and the woman develop on different paths.

Couple with this what has been urged as differentiating the effects of the unequal distribution of the reproductive system in the two sexes, and it is clear that the *establishment of puberty in the girl is not only coincident with an arrest of nutritive development, but is the cause of that arrest.* From that epoch the nutritive functions are in abeyance.

So this earlier arrest, which is substantially the woman's earlier physical development, explains her more rapid mental maturity. That, at the same age, the girl is more mature than the boy, is accepted. Not only are her intellectual operations quicker, but, by consequence, she has amassed a greater aggregate of intellectual experiences, rendering her judgment more mature. Her physical development has brought into exercise a *greater number* of her psychical capacities.

VIII. But the more widely distributed nerve force, the antagonistic influence of the reproductive system, and the earlier arrest of the nutritive development, to which are referable, directly, the physical, and indirectly, the psychical characteristics of woman, and which constitute the physiological law of her being, do not in the least degree affect the integrity of her being. Her hold on life is stronger than man's. "The vital tenacity of woman is superior to that of man, as is well proved by the greater facility with which she bears deprivation of food or submits to

bodily torture and anguish of mind."*

Nervous force has only a certain relation to vital force. Nervous force has its variation in sensitiveness; vital its variation in resistance. Nervous force varies with the integrity of a system; vital with the integrity of a congeries of systems. Vital tenacity bears no fixed relation to nervous susceptibility. The most exquisitely sensitive may or may not be of high vitality—the latter varying with the integrity of an entire organism; the former manifested indifferently in healthful or diseased conditions. So, while the superior vital tenacity of woman is a matter of clinical experience, it is likewise a logical sequence of her organization.

Woman, therefore, is a law unto herself, and the conditions of her best physical and psychical development are imposed by the laws of her organization. To produce her best estate, the appliances of the better civilization must be adapted to those conditions. One part of her may be developed at the expense of another, and her characteristics, as woman, may be indefinitely modified by the varying circumstances which influence her life; but this cannot militate against the demands of the physiological laws by which her being is regulated, and in accordance with which, if at all, the best intent of her life is to be realized.†

The ideal woman is not the dream of poetry, but a reality of flesh and blood; a material organism animated

* Tilt, Introduction to Diseases of Menstruation.

† At the late meeting of the American Medical Association, held at Louisville, Ky., May 5th, 1875, Dr. Allen, of Lowell, read a paper in which he claimed that the truly normal standard of womanhood was that of the highest anatomical development and of the greatest physiological excellence.

by an immortal spirit. It would be unfair to stamp her as the typical woman, who, browned and toughened by labor in the field, fulfils the grosser duties of her calling, and rests her aching body on the mattress of husk, renewing day by day this ceaseless toil, and for whom there is naught but toil; as it would be unfair so to typify the purple-veined transparency of some ethereal sainthood in woman's form, who, wrapped in silken seclusion, knows naught of the freshness that animates created things, and cares naught for the struggle out of which men hope to see the light.

Her individualities are more strikingly developed as she emerges into civilization from the repression of barbarism. "Observations prove that women who are not exposed to depreciating influences can compete in strength and endurance with the men of their races, and in savage countries they are sometimes regarded as superior to them." "The human female, if properly developed and placed beyond causes which militate against her physical well-being, would be in no great degree the inferior of the male; but the customs of civilized life have depreciated her powers of endurance and capacity of resisting disease."* Upon her advent into civilization, she changes infinitely more than the man does, evincing her greater sensitiveness to external influences,† and her greater susceptibility to the action of external agencies.

So if, under the higher influences, the predominance of the nervous system, activity of the imagination, in-

tensity of emotion, and a greater sensitiveness became manifest, these do not mean that she has a nervous system and no stomach, lungs and no liver, emotion and no intellect or will, sensitiveness and no ability to endure; but it does teach that she has certain disturbing influences to avoid, so that her bodily vigor may be a fit medium for the co-ordinate development of her intellect and emotions, and so that her sensitiveness may be trained into effective ministry.

Finally, this later civilization will not brook with impunity, or in silence and without protest, the sneer of the ages, which has been flung out in the adage, *propter uterum, mulier est*; the implication being, *uterus, et præterea nihil*. If the foregoing outline of the physiology of woman holds within itself any accuracy of description, it must establish the fact, that in the general functions of the human body the maintenance of the individual stands *first*, and *then* the continuance of the species; that the former is a constant and necessary factor, and the latter exceptional and contingent.

Just as truthfully can it be said of man as of woman, that it is his mission to give birth to mankind, for, in the economy of things, one is as essential as the other to the result; and just as certainly is it true, that his energies are expended, correspondingly with her's, in providing for the born and unborn generations. That the duties required are different, that the psychical natures are differently impressed by the conditions these duties impose, are unquestionable truths. But to assert that her share in the continuance of the species involves more than *one*

* T. G. Thomas, M.D., *Diseases of Women*, p. 53.

† See Hodge on *Diseases of Women*, p. 71.

of her capacities is to contradict the facts of her physiology.

The wrath of some of his critics came down hot on the head of a medical gentleman, who, lately, with rare good courage, bent a valiant bow in demanding that periodicity should have due consideration in the schemes of female education. And, without doubt, periodicity will henceforth be taken into account. But regard to the periodicity is urged only as one of many hygienic measures that the integrity of the body may be so saved from harm, that the psychical nature in the woman may have the broadest and most excellent culture. Under a wise discipline and guidance, conducted by processes devised to strengthen, and not impair, her physical well-being, processes that take herself into account, and not another, this culture promises for the future far more than has as yet been known.

DEVELOPMENT.

Growth and development are the physical characteristics of the period during which the body and mind are submitted to the educational process.

The epochs of this period are second dentition and the establishment of puberty; each resembling the other "in the increased development of the nervous centres and in the specialized evolution of nervous force."

Maturity and development are each subject to waste and repair. In maturity these processes are balanced. In the adult, the whole operations of vitality may be comprised in the preserving and recuperative processes. In the formative period, the *constructive* is in excess of the *destructive*.

The excess of the *constructive* is greater up to puberty, though the germinal capacity is not exhausted till full growth is attained.

All the parts of the organism do not develop with the same proportionate activity. The brain grows more actively than any other organ. From a weight of ten ounces at birth, to three and one half pounds in the adult, there is a rapid increase up to the seventh year, and then a steady decline in the progress of the increase till its maximum weight is acquired.

Childhood is the period of the greatest functional activity. "In the child everything predominates that is connected with organic growth, and of necessity with a redundancy of vitality, and on which alone the growth of the body depends. The desire for food is frequent, the digestion is rapid, the blood and all the fluids are in great excess, capillary action, secretion, deposition and interstitial increase proceed with great vigor, while the nervous sensibility is in the highest activity."*

The rapid increase of the brain explains, what observation proves, that in youth the nervous system predominates. All vital operations have their source in the nervous system, and all those actions by which the development of the organization is effected are directed by, and derive their energy from, the nervous system.

The capacity for resistance is in an inverse ratio to the rapidity of growth. It is a fact of common observation that the child, whose growth has been in advance of his years, will bear with less impunity loss of sleep, abstinence from food and extra hardship, than

*Stewart, Diseases of Children.

the child whose development has been more gradual. And this holds more particularly true as a physiological fact, when the growing child is compared with the adult whose formative processes have been completed. Though this is a physiological law, it is, at the same time, so easily apprehended by the most cursory observation, that no more urgent proof is required of the popular ignorance of the laws of health than the utter disregard of this maxim in the care of the young. The combinations of food that are allowed to children, the strain upon them in the over-excitement that is permitted in the name of pleasure, are as lamentable as the cupidity of parents in forcing the young into hard labor, or the mistaken sense of duty in whose name they are subjected to exhaustive brain work, are blamable.

Whether a man or a child turn a grindstone will depend whether it sharpen an axe or a penknife. What is true of nerve and muscle is true of organ and function; but then the organ itself is a varying quantity during development, and the stage of development varies its resisting power. As a matter of size, the child's stomach is smaller than the man's. It is a physiological and mechanical inference that it cannot do the work of a man's. But then the force that is back, by whose energy the digestive fluid is secreted, is less powerful in the child. And, still further, there is the rapid change to repair waste, and the slower change that increases substance, continuously at work. It is easier to disarrange the harmony of two forces working together than to affect the integrity of a single force. Arrest of development

in one of a series of connected organs is a modification of the whole series.

Why is it that the growing boy cannot indulge in the same extravagant food with the same impunity as a man? Certainly not because the histological and structural organization of his stomach is unlike the man's; not because his gastric juice is chemically different, but solely because violence is offered to the processes of development. The analogies are manifold; but the principle that underlies them all is, that whatever interferes with the physiological processes of development is fraught with the certainty of ultimate imperfect development, proportioned to the force and continuance of such interference.

It is a physiological precept that an organ is disordered in proportion to its previous activity. The intractable character of intestinal disease and the violence of pulmonic disorder in young children are pertinent illustrations. The same precept applies to the organic disorders that supervene on artificial stimulation. A notable instance is manifest in the severity of acute cerebral disease, and the incurable nature of chronic cerebral disease, the result of an overwrought brain.

Over excitement of a delicate and partially-developed organ is hazardous. The rapidity with which functional sometimes passes into organic mischief during the period of bodily and mental development finds its explanation in the disturbance of that uniformity with which the constructive is in excess of the destructive process, during the formative period. One of the very best observers of the diseases of child-

ren has formulated the statement that, "in infancy and childhood, pain referred to any part signifies, almost without exception, that disease of some sort or other is going on there or near at hand,"* admitting, however, the single exception of the existence of one form of true neuralgic headache, developed in school children, which, in after years, may exist in the same persons as hysterical sick headache. The contrast between the significance of functional mischief in children and in adults is sufficiently striking in estimating the limits of resistance in development and maturity.

Weaknesses result from a too early or excessive tax of functions. The principle applies not only to inharmonious development, but to the inefficiency of organs that are proportionately developed. The effect on the heart from over exercise, as among the University boat-racers, and the mal-nutrition resulting from inappropriateness of food, are well-known examples.

As a matter of clinical experience, the constitutional diseases of childhood are dependent on the imperfect

performance of the digestive and assimilative functions, and on an irritable state of the nervous system. The rapid increase of the growth of the brain, and its controlling influence as the source of nervous power, and the dependence of harmonious growth on the integrity and activity of the digestive and assimilative functions, demand, if harmonious development is the end sought, that the conditions suited to these should not be interfered with.

It is not pertinent to this inquiry to institute any formulary by which the health of the child shall be preserved, or what measures should be enforced whereby the nervous system shall be kept in abeyance, and the nutritive processes promoted to their best performance. It is essential, however, to insist that the nervous system is easily rendered irritable in childhood, and the nutrition easily disturbed. It is essential to insist that, popular ignorance to the contrary, the child is not the man, and the conditions needful for the proper development of the child are not the conditions whereby the man is recuperated and preserved, and that the limits of resistance are not the same in the two periods.

* On some Disorders of the Nervous System in Children. Chas. West, M. D.

PART III.

THE PROCESS.

The charge of indelicacy has been flung at the discussions on the education of women that are occupying public attention.* The urgent plea of those who would educate women up to a better comprehension of life, is met by the frank argument that a great deal of the present system of the school education of girls has resulted in injury to their health; that, if a higher education is sought for them on a similar system, the results will be manifoldly worse. The claim is that woman has a physical organization peculiarly her own, subject to certain grave disorders, the tendency to which is aggravated by the system of education. The claim has been made good in the only way possible, by illustrating how this system has developed these disorders. If this social reform is to triumph, it must triumph in the face of the facts. If the facts prove it to be inherently weak, no plea of sentimentalism should be interposed in so grave a

matter. "Those who advocate the higher education of women, carried away by their zeal into an enthusiasm which borders on, or reaches, fanaticism, seem positively to ignore the fact that there are significant differences between the sexes, arguing in effect as if it were nothing more than an affair of clothes, and to be resolved in their indignation at woman's wrongs to refuse to her the simplest rights of her sex. They would do better in the end if they would begin by realizing the fact that the male organization is one, and the female organization is another, and that, let come what may in the way of assimilation of male and female education and labor, it will not be possible to transform a woman into a man."*

As has already been pointed out, the profession of teaching occupies such a relation to the child as to limit its observations specifically to the mental culture. On the other hand, the parent on whose advice

* Sex and Education: A Reply to Clarke's Sex in Education, pp. 7, 29, 52, 91, 126.

* Henry Maudsley, M. D. Sex in Mind and Education. Fortnightly Review, May, 1874.

and direction the child's future health is practically dependent, is not competent to interfere with the school training. The social scientist, informed by the investigations of the physiologist, and looking to the interest of the State, is endeavoring to enlighten the public sentiment, so that the process of mental culture shall not trespass on the physical well-being. So far from placing any obstruction in the way of the broader or more general culture, he insists that that culture can best be obtained if conducted by processes that do not conflict with sound, vigorous health. The social scientist must appeal to the physician. "The new departure of the higher female education should, unquestionably, be from the results of the medical profession. We believe that physicians have by no means yet taken the share in general education that the interest of society require; but when the mental cultivation of women is to become systematic, and they have their own higher institutions, the agency of physicians will be indispensable."*

Of course all investigation will go for naught if comparison of one state of refinement is to be made with another entirely different. The children and the women of this country are not to be judged by the same rules that apply to another grade of civilization. Neither can any adequate comparison be instituted between the city and the country. And though, as has been shown in the preceding section, the law of organization holds wherever human beings are found, yet the special conditions under which

they exist can never be left out of the account. The argument that has been rehearsed has not only endeavored to show that woman in her whole history, from childhood to maturity, is more impressible than man, a fact sustained by all observation and experience, but it has also given a physiological statement of the physical laws of her organization, whereby that greater impressibility is the *fact* and the *necessity* of her organization. The generally accepted fact, that the psychical manifestations are through the medium of the physical structure, has been joined to the doctrine that structure modifies manifestations, and the psychical characteristics of woman are shown to be due, not to difference in psychical elements, but to the same psychical elements manifested through a difference in physical organization. Herbert Spencer, in his *Psychology of the Sexes*, while he claims that woman is mentally, as she is bodily, unlike man, yet asserts that their psychical differences relate to their respective shares in the rearing and protecting of offspring. A careful survey of the preceding argument will disclose how unfair is this claim for the essential difference.

School hygiene, referred to the physiological relations of age and sex to mental and physical education, is a removal of such school influences as are noxious or injurious to the perfect performance of the mental and bodily functions, and the substitution of such conditions as shall ensure the co-ordinated development of mind and body. Physiology intrudes on the domain of the mental phenomena and the mental processes, only so far as to

* Popular Science Monthly, Ed. Table, No. xxiv.

insist that the best results of mental culture are to be assured by the best bodily conditions, and that the conditions under which mental training is conducted shall not be such as are injurious to bodily development.

It is not to be forgotten that the enforced restraint and the confinement, which are the necessary contingents of school life, are not the conditions most favorable to the best bodily development. But if it is borne in mind that in the most advanced school hygiene, these necessary contingents do exist, the preliminary step will be taken whereby the evils incident to school life may be reduced to their minimum. If it can be ascertained what are the conditions most suitable to the growing child, and what are the conditions best adapted to the special organization of the maturing girl, the conduct of the mental training can be made, not only not to injure and restrain the bodily development, but practically to assist that development.

But life from the cradle to the grave is beset by opposing influences, and the influence of school life is but one in the catalogue. The preservation of health and the prolongation of life are desirable, that usefulness may be increased. To be well is not an end in itself, but a means to an end. It's a poor estimate of life that cares for health as an immunity from suffering; it's an equally mistaken notion that is forgetful or reckless of health in the strife for higher effort or attainment. The limit of resistance has often to be encroached on, and the question of direct importance is, where is that limit? There is no rule applicable to two individuals. The boy is not

as the girl, the child as the man. The mental discipline that is to make life honorable and enjoyable must, so far as the conditions of school life are concerned, be conducted on a system applicable to certain averages of age and sex; but an inflexible system will hinder some and injure others.

The hygiene of school life is not to be based on the principle of furnishing the greatest amount of mental culture to the greatest number, permitting those who are unable to drop altogether from the ranks, but on the principle of furnishing to all the greatest amount of mental culture, to each according to his ability to receive. This mental training is associated with more or less enfeebled bodies, and the conditions of this training are to be adapted to the bodily resistance. The judicious training is to re-act in recuperating the bodily vigor. There is ample illustration of this fact, but an official investigation of the influence of education on the public health in France was made by M. Du Mesnil, the result of whose investigations was given in the *Annales d'Hygiene Publique*, in 1872. From a comparison of the reports on recruiting for the army, with those on the progress of education, he found that those departments in which the proportion of illiterate persons was greatest presented the lowest duration of life, and the smallest average stature; while in those where primary instruction was most completely carried out, the people lived longer and were of larger build.

Now the school is established to so systematically culture the body and

mind, that the best results may be achieved in after-life. It is systematic discipline as opposed to hap-hazard, self-made culture; and the harmonious development of all the threefold faculties of the child, physical, mental, and moral, which was Fröbel's idea, is not to be lost sight of. "Education is an affair of the laws of our being, involving a wide range of considerations—an affair of the air respired, its moisture, temperature, density, purity, and electrical state, in their physiological effects; an affair of food, digestion, and nutrition; of the quantity, quality and speed of the blood sent to the brain; of clothing, exercise, fatigue, and repose; health and disease, or variable volition and automatic nerve-action; of fluctuating feeling, redundancy and exhaustion of nerve power; sensuous impressibility, temperament, family history, constitutional predisposition, and unconscious influence; of material surroundings, and a host of agencies which stamp themselves upon the plastic organism and re-appear in character."*

No age and neither sex is exempted from certain hygienic necessities, if good health is to be preserved while subjected to the discipline of school life. If the lungs are to inspire sixteen times a minute and twenty thousand times a day, and if headaches, oppressive feelings in the chest, dyspepsia, nervous disorder, lassitude and debility are the immediate consequences of breathing impure air, clearly good ventilation, which is simply "letting out the foul air and

letting in the fresh air,"* is a necessity. "Those who habitually take in fresh breath will probably grow up large, strong, ruddy, cheerful, active, clear-headed, fit for their work. Those who habitually take in the breath which has been breathed out by themselves, or any other living creature, will certainly grow up, if they grow up at all, small, weak, pale, nervous, depressed, unfit for work."† The kindred matter of heating is of similar general importance.‡ The construction of seats and desks,§ the regulation of the light to save the eyes of the scholars,|| sewerage, and privies¶ demand attention; the investigation of sick children, compulsory vaccination, and the exclusion of contagious diseases, all are universally necessary and capable of being enforced.

The application of the physiological principles which have been discussed, can be appropriately considered in the order of

- 1st. Apportionment of Time;
- 2d. Character of the Application;

*Ventilation of School Houses. Second Annual Report of the State Board of Health, 1871. Fourth Report of Metropolitan Board of Health of the State of New York, 1869. The Ventilation of School Rooms, by A. C. Martin, Architect. Second Annual Report State Board of Health of Mass., 1871.

† Kingsley's Health and Education, p. 27.

‡ Hygiene as applied to the construction, warming, ventilation, and sewerage of School Buildings, R. C. Kedzie, M. D. Transactions Michigan State Med. Soc., 1873, pp. 53 and 54. The same enlarged; Report of the State Board of Health, Mich., 1873.

§ The Decorum of the School, H. O. Hitchcock, M. D.—Transactions Michigan State Med. Soc., 1873, pp. 53 and 54. The Influence of Posture on the Health of Women, an elaborate and excellent article by J. H. Aveling, M. D., in the *Obstet. Jour. of G. B. and I.*, Nov., 1874.

|| Remarks on Dr. Cohn's Observations, by D. F. Lincoln, M. D., in a Report on School Hygiene to the Amer. Scien. Ass., 1874.—School Hygiene, F. Winsor, M. D. Fifth Annual Report State Board of Health of Mass., January, 1874, p. 404. Transactions of the New York State Med. Soc., 1873, p. 76. School Diseases, by C. R. Agnew, M. D. Sanitarian, Sept., 1874.

¶ Phil. Med. Times, No. 95, p. 737. Med. and Surg. Reporter, No. 838, p. 248.

* E. L. Youman's, Popular Science Monthly. No. XIX.

3d. The dependence of School on Home Hygiene;

4th. Identical and Co-education;

5th. The Purposes of the Higher Education defined by Structure.

1st. Apportionment of Time.

In certain grades of social life the length of the school hours is the test of the excellence of the school. The industries of home life are interfered with by the presence of children. But there is a popular belief, running through all grades of social life, that those schools are the best which take the children youngest, where the children learn the fastest and cover the most ground in the shortest time. Instances as notable as the case of John Stuart Mill, who learned Greek of his father at the age of three, and other instances of similar precocity that crop out from the ordinary level of childish intelligence, are quoted as spurs to the industry of the young, and as incentives to the ambition of parents. There are as notable instances where high attainments have supervened on mental training that was not systematically commenced till maturity. Early mental culture is not essential to the production of the highest mental powers.

There is a general assent to the statement that children should not be sent to school before the seventh year. Before the third year of life all the parts of the body have experienced their fastest growth. After the seventh year the length of the body has an ordinary uniform growth; up to the seventh year there is a uniform lessening of the growth. The normal proportion of the upper portion of the

trunk to the lower is reached with the eighth year. "The lumbar region grows principally up to the ninth year (then again between twelve and fifteen). This should be developed before children are compelled to remain long in a sitting posture." "Between the fifth and sixth years the base of the brain grows very rapidly, the frontal bone protrudes anteriorly, and grows upward. The anterior portion grows considerably, but still the white substance and middle portion of the brain are prevalent. These are the organs for the receptive faculties and memory. All this points to the end of the seventh year as the period of beginning of mental work."*

Mental exercise increases the flow of blood to the brain, increases its size and modifies the structure of the brain; so, while the gray matter is developing, the reflective faculties should not be urged beyond the development of the gray matter. The first years are years of sensation, and "up to seven or eight years the perceptive faculties are sufficient to keep the mind fully occupied in acquiring the knowledge to be gained by observation." Whatever development there is beyond is precocity, and precocity is nearly always disease. "Intellectual effort in the first years of life is very injurious. All labor of the mind which is required of children before their seventh year is in opposition to the laws of nature, and will prove injurious to the organization, and prevent its proper development."† The

* Dr. Jacobi's remarks on a paper of Dr. J. R. O'Sullivan, before the N. Y. Acad. Med., August, 1873.

† Hufeland. *Art of Prolonging Life*. The whole subject of too early mental training is discussed in "Mental Exertion," by A. Brigham, M. D. London, 1866.

Superintendent of the St. Louis Public Schools has put on record that children who enter school at eight years of age can, on the average, make nearly double the progress in primary work that pupils of five years of age can do.*

But as children under seven years of age are likely to be sent to school, it is of paramount physiological importance that the school hours should be judiciously apportioned. Frequent and varied movement and occupation are the incidents of a child's life in its waking hours. From one to three hours a day, and in divided sessions, is the limit to which young children should be subjected to school restraint, and these sessions should be broken up by frequent opportunities to change the posture. The limit of cruelty is reached when these busy, active creatures are kept confined to their seats one, two, or three hours at a time. The advice of T. W. Higginson† is good—"send them to that school whose daily hours of session are the shortest, and whose recess time and vacation are of the most formidable length." Dr. J. R. O'Sullivan, whose opinion, as the late physician to the Board of Education of New York, is entitled to great respect, says: "The hours of study are too long, especially in the infant classes. It is extremely unwise to require of little children that they should observe silence and sit quiet in their places for any length of time. The very condition of the development of mental or bodily faculties is use, exercise. But in school the child

is required to refrain for hours at a time from that play of the muscles, from that exhibition of the exuberant life which is so natural to it, which, indeed, is as necessary for it as the inhalation of pure air."

The absurdity and cruelty of thus confining young children are apparent when it is considered that this school regime is, for all practical purpose, *systematic bodily restraint*. The physical conditions, under which alone the child can properly develop, are not only violated, but they are reversed; and this repression is reduced to a system. It is not only systematic bodily restraint from freedom of exercise, but restraint to a uniform, fixed position; and further, it is systematic bodily restraint to a constrained position, in the more or less vitiated atmosphere of a school room. Is it to be wondered at that Frœbel worked out his philosophy of the lawn, the flowers, and the open air?

But if the best physiological development is opposed to subjecting children under seven years to the restraints of school life, and if the school session should be limited for those who must be sent to school to a very few hours, and these to be broken up by frequent intermissions for exercise, what is to be said of the time to be spent in study and confinement by the children of more advanced age, the pupils in attendance on the academies and higher schools?

Certain general principles can be stated which ought to be conclusive as to the excessive occupation of time so generally demanded by the schools. Four hours in one session and five hours in two sessions, with certain re-

* See Report, 1872 and 1873.

† Murder of the Innocents. Atlantic Monthly, September, 1859.

cesses, are the ordinary periods allotted to the school time of each day. Add to this the extra time in which children are "kept in" for certain negligences or misbehavior; the time spent over the studies prescribed to be learned at home; the compositions and the like which are expected to occupy a certain portion of the Saturday; the preparation for competitive examinations, and for the "school exhibition of music, one of those bad and useless modes of ending a school term which are full of evil for the moral, mental, and physical organization of girls,"* and an average of thirteen or fourteen hours of each day are given body and soul to the implacable tyranny of the school regime. This is no fancy picture. An amount of mental work is obtained from young and half-grown (which means growing) children which would be hazardous to adults. Sir Walter Scott, who had good reason whereof he was speaking, gave it as his deliberate opinion that five and a half hours form the limit of healthful mental labor for a mature person.†

* S. W. Mitchell, M. D. Med. and Surg. Reporter, No. 936, p. 103.

† Last year the State Medical Society of Rhode Island referred to a committee the subject of "School Hygiene," with instructions to investigate and report thereon. The report has recently been presented to the Society, which, after earnest consideration, unanimously passed the following resolutions: "Resolved, That physical culture is of primary importance in our public schools, and that gymnastic exercise should be made a part of our school system; that the "Kindergarten system" should be engrafted upon our public school system; that the school buildings should not exceed two stories in height; that three hundred cubic feet of space and twenty-five square feet of floor space should be the minimum for each child in a school-room in connection with good legislation; that proper warmth and pure air are of the first importance, and should always be considered before ornamentation; that scholars should not maintain the same position more than half an hour at a time; that two short sessions daily are better than one long one; that no child should be admitted into our public schools, as now conducted, under seven years of age; that under twelve years of age, three hours a day, and for twelve years and over, four hours a day is sufficiently long confinement to mental culture; that study out of school

This extent of time spent over school studies seems to be based on the egregious blunder that all the mental acquirements possible for life are to be secured in youth, with an absolute forfeiture of any claim the body may have for its development and culture. It is forgotten that the brain is an integral part of the living organism, needing rest, refreshment and recuperation. Furthermore, it seems to be forgotten that this brain itself is a developing quantity which is to be guided to a correct development by the teacher's brain, which is supposed to be capable of imparting this instruction.

Studying at home, studying without help, is akin to original investigation, the most refined capacity of mature, well-disciplined minds. Practically the school hours are largely occupied in reciting the lessons that have been learned at home. The scholar is less *taught* than *examined* in his studies. If five and a half hours are the limit of healthful mental labor at maturity, what plea can be urged for the unresting sleep that follows thirteen or fourteen hours' mental labor for the growing youth? Clearly this: confession must ensue that it is a crime against physiological law. If brain work not only exhausts the general energy, which must be recuperated to sustain vigorous health, the growing child must have time not only for the recuperative, but for the constructive processes to have fair play. Muscular effort and brain work are in violent contrast, and brain

should not usually be permitted; that all incentives to emulation should be used cautiously, especially with girls; that the "half-time system" should be introduced into our public schools.

work should be followed by that effort to which it is most violently contrasted.* The persistence of school-work should be contrasted with varying amusements at home. The capacity for sleep and the desire to eat are the qualifications of healthful, vigorous growth. School and home-life sacrificed to thirteen hours over books will destroy both.†

The sexual differences are manifest in the varying resistance to this terrible onslaught of prolonged study. Girls yield more readily and more generally to the effects of this continuous mental effort, with its enforced bodily restraint, than boys. To the end of the chapter, under precisely similar external conditions, the girl will be herself, and not the boy. She is less inclined to this contrasted effort, does not naturally seek it, and, furthermore, as a rule, will not take it. If clinical experience were to be quoted, the number of girls from twelve to eighteen that come under a physician's care is vastly in excess of the boys during the same ages. And this is true not for ailments of a special character, but because of general weakness. Here it is fitting to advert to the sneer that the physician sees only the unsound side of life, and, therefore, his general statements are to be taken with allowance. Let it be observed how small a proportion of *malaise*, functional disorder, and that range of symptoms indicative of diminution of vital force, is ever presented to the physician's notice. How

vast the sum of the burdens of life that are borne in weakness! Boys break down by over-study. There are instances in academy and college. But the number is infinitely less than the girls, who, from sixteen years on through life, are the victims of nervous disorder, traceable to over-study—study unduly proportioned to the exercise and change needful for the bodily development. The superiority of woman's vital force is here clearly shown. Boys do break down; and they turn their life into another course or they die. By her possession of this superior vital force, which enables her to endure so much, the girl passes into womanhood, and bears up under its burdens, oftentimes with forced spirit and enthusiasm, enabled so to do by the constitution of her being. Her impressibility is supplemented by her vital force.

2d. Character of the Application.

In this portrayal of the physiological relations of the educational process to mental and bodily education, the mental processes are not discussed, and the physical conditions are made prominent, on the ground that symmetrical development of the body must not be interfered with, and the integrity of the body must not be impaired if the best mental results are to be realized. And, further, no discussion is demanded of those external conditions, hygienically applicable to age and sex alike. In differentiating the conditions especially demanded by sex, the architecture of school houses is of peculiar importance. No adage is more trite than that "God made the country, and man made the

* One of the faculty of Princeton College relates to the writer that it is his custom to go from the class-room direct to the gymnasium, as the necessary and best tranquillizer of his nervous system.

† See above. Winsor's article, p. 403.

town," and it is equally true that man is the only animal that voluntarily goes up stairs. Furthermore, the human female, alone of the animal creation, carries her reproductive organs vertical to the horizon. Add to this that the long and broad ligaments that maintain the uterus *in situ* are attached, not vertically, but laterally; that the toughness and spring of these ligaments are in dependence on the general tone of the system, and it will be seen that the security of the maintenance of the uterus in its normal position is likely to be easily disturbed.* Climbing mountains or stairs is fatiguing work. It needs not an experience on Mont Blanc or up Bunker Hill Monument to test the fact; daily experience in city homes and office buildings is adequate. It causes a man's legs and back to ache; but whenever there is the least tendency to mal-position of the uterus in a woman, it is so appreciably provocative of distress, that she refrains from it, so far as possible, from motives of self-preservation, independent of a physician's counsel. Consider further, that at the age of puberty the uterus suddenly triples its bulk, and demand of the maturing girl that, at her period of *malaise*, oppressed by the enforced restraint and fatiguing effort of school life, she shall from four to a dozen times a day go up and down three or four long flights of stairs, to meet the emergencies of our lofty school houses, the architectural pride of our towns and cities, and violated nature prays that physiological knowledge may

be hammered into the Educational Boards.

Variations from the norm constitute a pathological state, no matter whether a community, a state, or a race is the subject thereof. If the whole race of melted-glacier drinkers were goitred, goitre would still be a pathological condition, and not a racial idiosyncrasy. There are numerous instances of men whose continuous and manifold intellectual exertion surpasses by far the ordinary endurance of man. It is none the less true that men are continually breaking down in the rush of our civilization. Why? Most certainly not because there is a difference in spiritual composition, by which one man is stronger than another, but because the laws of heredity and the multitudinous untoward influences of life have rendered one man's brain weaker than that of his more fortunate fellow. There is such a climax as excessive intellectual exertion, and it means that when a man's body and his brain, which is part of his body, has come up to, and crossed, the rubicon of its resistance, effort is palsied and the delicate instrument droops.* Need it be urged, must it be urged, that this palsy and this drooping are seizing on the freshness of many of the splendid promises of our school youth, martyrs to custom, martyrs to fashion, martyrs to the unbending implacableness of the school routine? Bitterly true is

* Difficult as it may be in some instances to ascertain quite accurately whether an overworked man had perfectly sound health to begin with, obvious as it may be that in many breakdowns the final failure has been accelerated by diseases independent of mental work, the facts remain, that the excessive exercise of the mental powers is injurious to bodily health, and that all intellectual labor proceeds upon a physical basis. No man can safely forget this, and act as if he were pure spirit, superior to physical considerations,—The Intellectual Life. By T. G. Hamerton, p. 5.

* A terse and excellent statement of these evils may be found in Dr Kelzie's Report to the State Board of Health of Michigan, 1873.

it. Not the slovenly, not the lean in mind, but the buoyant with ambition, the earnest in duty, the strong in effort and in hope, who, led on by reckless incentive, find the light of the eye and the light of the mind fading, never to regain the brilliancy the first promise foretold.*

"The lives and health of our children are frequently compromised by crowding studies, many of them of no practical use whatever, at a period of life when much of their time should be spent in the open air, taking exercise in some way. Instead of this they come home burdened with a lot of books, which, especially in the case of girls, makes their sides ache, and does irreparable injury to their health, and with a sense of responsibility in regard to the lessons of the following day that should not rest upon them. The consequence is, they deprive themselves of needed exercise and recreation of body and mind, go to bed discouraged and out of humor, pass an uneasy, restless night, and rise with headache and no appetite for breakfast, and sometimes no time to eat it, if they had an appetite. We speak here of studious, faithful, conscientious children, the 'dull scholars' often, who are ambitious to learn, not of bright, unfaithful ones, who get a mere smattering of their lessons and spend the hours of the evening, aye, and of the night, in revelry, but who often rank higher with their teachers than those whose young lives and ar-

dent aspirations are being crushed out by injudicious cramming and too little encouragement. As a rule, school hours are the time for study, and out of school, children should take exercise and recreation' in various ways, should assist their parents in household matters, and in this way acquire something beside book-knowledge. This would speedily lay the ghosts of the 'pale, beautiful faces, with mild blue eyes,' that are daily going down to the grave, the victims of overwrought intellectual labor." *

Brain-work and brain-worry are not co-terminous. The former is conducive to health and long life, while the latter is itself the cause of distress. In each case the material brain is at work, and the continuance of the work is the exhausting feature. As a matter of physiology and of experience the impressibility of the girl renders her, in the face of penalties, incentives and competitive study, vastly more the victim of the depressing consequences of this worry over school requirements.

Rest is of two kinds, absolute and relative. The tired muscles seek rest in repose. The tired brain finds absolute rest only in sleep, which is inaction. During waking hours the brain is never in absolute rest. It finds relative rest in change of labor. *Brain-worry is continuous brain-work over one labor.* It is a settled fact of experience that the increased flow of blood sent to the brain, during great mental activity, produces interstitial changes if prolonged. As a result of these changes, wakefulness is one of the earliest and most obstinate symp-

* I compare the life of the intellectual to a long wedge of gold—the thin end of it begins at birth, and the depth and value of it go on indefinitely increasing till at last comes death, who stops the auriferous processes. Oh! the mystery of the nameless ones who have died when the edge was thin and looked so poor and light! Oh! the happiness of the fortunate old men whose thoughts went deeper and deeper like a wall that runs out into the sea!—*The Intellectual Life.* By T. G. Hamerton, p. 47.

* Medical and Surgical Reporter, Editorial, No. 831.

toms. Almost always entire change of scene and occupation is necessary to secure this inaction of the brain. Once again let it be insisted how strong is the physiological case when applied to the immature and developing brains of boys and girls. What is done *con amore* is done without harm; what is done under the lash of strain, prostrates. Encouragement should supplant penalty. Anxious care should not grind off the edge of youth's natural buoyancy.

So it is clearly not the amount nor character of study to which the physiologist is opposed, but to the vices of the mode and the bad habits engendered in its prosecution. He demands only that the character of the application should be so judiciously formed that the conditions under which the child studies shall not obstruct the free development of the child. To this end he demands that the brain shall obtain its relative rest in the surroundings which are needful for the body's most refreshing exercise.

To answer all the questions that arise on the introduction of a subject so important as exercise, is not in the province of this discussion. The advance of civilization has lessened the demand for personal strength as a subduing agency. Gunpowder has thrown the lance and the buckler into the museum, and nitro-glycerine has but secondary use for the sledge and the drill. But mere muscular strength is not essential to health, and neither is exercise needful solely for the development of muscle. The exercise that is to sharpen the digestion and increase the lung power is of far more worth.

It is of the highest importance that the conditions of judicious exercise should be understood, not only during the long dependence of the intellectual development on the integrity of the body in the course of a liberal education, but likewise during the formative period, while the body and mind are both being developed. What is proper exercise for one child is violent for another. When Dr. Farquharson was medical officer to Rugby School, he found that in the few cases of cardiac strain that occurred the boys had usually been working hard, and had undergone excessive physical fatigue when worn out by mental labor. Skilled gymnasts practice on the principle that exercises of a moderate character, continued for a long period, produce the best general development. Though such exercises are very fatiguing, the result obtained is the ability to endure. "Let it be well understood that muscular labor is not muscular exercise any more than promiscuous feeding is dietetics. *L'art pour l'art* must be the motto of him who exercises his bodily power with the object of improving his health."

The details of this problem ought to be in the physician's gift. In the homes of his *clientelle* his function is advisory, and the advice will largely be accepted *ex cathedra*. Ultimately the problem will be settled out of his resources in its application to the large schools, where masses of children are herded, where the children come from all grades of social life, and where the enfeebled are ranged with the strong. The physical and the mental discipline must be apportioned to the individual.

3d. The dependence of School on Home Hygiene.

Assuredly it requires no apology, in the discussion of school hygiene, if account be taken of the influences of social life on the physical status of the pupil; for the particular mental training, and the conditions under which that training is conducted, must vary with the physical condition that has resulted from the discipline of home. For the same reasons that bind together the teacher and the parent, the union between home and school hygiene is so intimate that their divorce cannot be contemplated.

The teacher's query is, how is the material sent him to be best managed. He has no choice of material. It is one thing to provide a hygiene for an abnormal condition of sensitiveness, with a mode of life forever fostering that sensitiveness, and still another to provide a hygiene suitable for a well-balanced organism whose functions are naturally performed.

The parent's study should be how best to guard and nurture the child so that it shall be most capable of deriving advantage from the discipline of the school. Children should be sent to school well. The school ought not to be compelled to provide against systemic conditions that should have been prevented at home. It ought not to be censured for injury to health which is committed in the home.

The social vices in which children participate, through the folly, the ignorance and the neglect of the parent, unfit them for the school. The recklessness of living does unfit for mental culture. There are influ-

ences, other than mental training, destructive to the body.*

"Disease, whether preventible or inevitable, poverty, ignorance, and dirt, at one end of the social scale; luxury, fashion, social dissipation, and amusement, at the other end," each, in its own way, perverts and exhausts the functions of the brain. The menial service and hard work of one social grade furnishes to the school material, only less poor than that supplied from another social grade, weakened by conventional restraint and over-indulgence. The one is a dull drudge, and the other a "dancing, flirting caricature of human nature."

But squalor and luxury are not the only social agencies that so depress the body as to render it incapable of submitting to the conditions requisite

* The following is the summary of the result of the investigation in regard to the health of pupils in public schools, read by Dr. D. F. Lincoln, at the meeting of the Social Science Association, held at Detroit, May 12, 1875:

First: School-work, if performed in an unsuitable atmosphere, is peculiarly productive of nervous fatigue, irritability and exhaustion.

Second: By "unsuitable" is chiefly meant "close" air, or air that is hot enough to flush the face, or cold enough to chill the feet, or that is "burnt" or infected with noxious fumes of sulphur or carbonic oxide.

Third: Very few schools are quite free from these faults.

Fourth: Anxiety and stress of mind, dependent mostly upon needless formalities in discipline, or unwise appeals to ambition, are capable of doing vast harm. It is hard to say how much is actually done; but a strong sentiment against such injudicious methods is observed to be springing up in the minds of teachers.

Fifth: The amount of study required has not often been found so great as would harm scholars whose health is otherwise well cared for.

Sixth: Teachers who neglect exercise and the rules of health seem to be almost certain to become sickly or to "break down."

Seventh: Gymnastics are peculiarly needed by girls in large cities, but with the present fashion of dress, gymnastics are impracticable for larger girls.

Eighth: The health of girls at the period of the development of the menstrual function ought to be watched over with unusual care by persons possessed of tact, good judgment, and a personal knowledge of their characters.

Ninth: One of the greatest sources of harm is found in circumstances lying outside of school life. The social habits of many older children are equally inconsistent with good health and a good education.

to the best mental culture. There are plenty of earnest, intelligent, thoughtful, prudent parents, who, by acts of omission and commission, are ignoring or neglecting for their children the important relations of healthful, mental and bodily conditions set forth in these pages.

There is place here only for mention of pure air and free sunlight for the children, judicious clothing, cleanliness, pure habits, home recreations, sound sleep and plenty of it, assured for the boys and girls. But is it not a matter of almost universal home experience, that, apart from all considerations of inappropriateness of food, school children are starving in the midst of plenty, and are sent, or allowed to go, to school, without any adequate amount of food? And is it not true that the girls are the more numerous and the greater sufferers? How frequent are the stories of a swallow of coffee for breakfast, cake and pie for luncheon, and too much home study to give any zest for the later meal! How constantly is the lament that the daughter is so troubled with constipation! If there be any doubter of these prevalent facts, he is outside of the physician's ranks. "Just as any system of teaching is a real success in proportion as it adapts itself to the peculiar needs—not of those who are quick and willing, but of those who are slow and averse to learn—so any scale of diet approaches perfection in exact proportion to the provision made, not merely for the average standard of taste and appetite, but for all reasonable deviations therefrom. The result with such boys and girls as do not get those

particular elements of nutrition which they specially require, is that even in the midst of plenty they remain permanently underfed and imperfectly nourished, thus retarding, if not arresting, the due growth and development of their bodies, and strongly favoring the development of any inherited or other constitutional unsoundness lurking within them."*

Should not the parent say, if you can't eat your breakfast, you can't go to school? How many times has a soup-plate full of easily-swallowed stiff oat-meal porridge, ordered by the physician and commanded by the parent, as a morning stint, saved from the noonday faintness, and provoked regular daily evacuations?

It is not needful to rehearse the story of the periodical function and its relations to school hygiene. That has already been forcibly told.† That persistent school attendance at the monthly period is fraught with serious evils to many, ought to be understood, and, likewise, that to any menstruating woman exposure to bad weather is a constant menace. But it should also be understood by the mother that not only the consequences of menstrual irregularities can be, to a great degree, averted, but the irregularities themselves are capable of being prevented. It is safe to assert that, to a great extent, these irregularities are held to be part of woman's primeval curse. The average mother, deeply sympathetic with the child, is sorry when puberty makes an early appearance in her girl, anxious when the period is painful, regretful when

* Food Journal, August, 1872.

† Clarke's Sex in Education.

it is excessive, and never dreams that, though constitutional taint may be hereditary, she herself, the mother, is personally responsible, nay culpable, by her neglect and bad management, for that daughter's condition.

The periodical changes in physical life with respect to the female sex are results of structure modified by habits. The notion that climatic and racial conditions vary the advent of maturity, has been and is generally accepted; but if any one will trouble himself to read the "Natural History of Man,"* and an "Inquiry into the Natural History of the Menstrual Function,"† and then consider the bearings of all that is said of the social conditions of savage life in "The Natural History of the Uncivilized Races,"‡ and afterwards consider how the physiological condition of woman renders her peculiarly susceptible to the enervations of civilized life, he will find himself arguing to the mothers that these menstrual irregularities are preventable accidents, censurable on the mothers if not prevented; that the daughters of the land may yet look to a school career not drifting into the angry armamentarium of the gynecologist, but uninterruptedly bearing them on into a cultured, fresh and painless womanhood.

Only one word more under this head. There is more under-rest than over-work. It has been shown that continued mental activity is the great

opposer of sleep. Let it be understood that there is no mental activity so intense as emotional excitement. The dreamy and the emotional must be kept in abeyance to the practical. "The impediments to sustained labor really inherent in woman's organization are to be put against those that are artificial, and this sensitiveness, acquired by over stimulation of the emotions, can be largely overcome by a fair share of healthy work directed toward a definite object, combined with an equally fair share of healthy play during the years of adolescence." *

4th. Identical and Co-education.

Discussion of these questions from the physiological plane, will be provocative of bad temper, and resultless for good unless some agreement can be had as to the limitations within which the physiological argument is pertinent. Co-education and identical education of the sexes involve many more considerations than the physiological. It is claimed that by the former greater economy is secured, discipline and instruction are improved, individual development is made more sound, sentimentality, prurience, and rudeness yield to mutual self-possession, and the association of the sexes on the plane of intellectual contest delays the development of the sexual tension. For the latter it is argued that the highest possible culture of the rational soul is the duty and the privilege of every human being, whether male or female. With these interesting and important questions the physiologist has no more and no less in-

* J. C. Pritchard, M. D., pp. 483 to 486.

† John Robertson, M. D. Edinburgh Medical and Surgical Journal, October, 1832, July, 1842, and July, 1843, wherein he has elaborated the proof that the age of puberty is as early in the cold as in the tropical regions of the earth; arguing that very early menstruation is a social infirmity, and not a climatic peculiarity.

‡ J. G. Wood, M. D.

* Huxley, Popular Science Monthly, No. xxx, p. 564.

terest than belongs to every intelligent and earnest man; neither, as physiologist, is his opinion on these questions of any special importance.

Apart from these, however, the physiologist has instruction to offer which is to be accepted as authoritative, because based on well-ascertained facts; and his teachings must be neither slighted nor misconstrued. When so able an advocate as the Superintendent of the St. Louis Public Schools asserts, in the course of an intelligent and good-natured argument, based on his personal experience, that the "majority of physiologists and physicians believe that the mind and its culture are subordinate to the organization of the body,"* and that "this materialism finds its delight in chilling the fervor of an aspiration by suggesting physiological limitation as that which should determine the question of the culture of the rational soul and the participation in the spiritual heritage of the race," certainly this large body of intelligent and scientific men is entitled to know what he means by "subordinate." If he is of opinion that the majority of physiologists and physicians believe that thought is a function of the brain, that molecular action in the brain cerebrates thought, he is entitled to the threat that "the intensity of the recoil" from such physiological doctrine will "have exactly the opposite effect from that intended." It may be submitted, on the contrary, that the majority of physicians do predicate moral responsibility of man and woman alike, holding to the belief that spirit is one, and that body is one,

that the body furnishes the conditions under which the spirit is made manifest, and that the spirit has no other subordination to the body than that by it its manifestations are limited.

The physiologist does hold, if the teachings of this paper are any adequate expression of the general belief, that these manifestations are limited and varied by bodily condition; that the health of the body, as expressed in its harmonious development, with its functions adequately fulfilled, is essential to the best mental culture; that the structural differences in man and woman account for their peculiarities of psychical manifestation, which are constant, irrespective of age, race, or clime; that as the races emerge and advance into civilization, the woman manifests her superior sensitiveness to external influences, and that the conditions best suited to the development and maintenance of her organism are different from the conditions under which man's organism ripens into its best estate.

The physiologist does not interfere with the *identical* education of women, save so far as to demand that the processes of mental culture shall always have regard to the laws of her physical being, and he protests against *co-education*, because the sexes are, in development and maturity, subject to different physiological conditions, and that, therefore, the physical conditions under which the boy's educational process is best conducted, are not the conditions best suited to the girl.

In the opinion of the physiologist, it would be a costly experiment—costly in the life and health of woman—that would throw open the doors of

* Annual Report of the Board of the St. Louis Public Schools, 1872-3, p. 109.

our colleges free to both sexes, and demand that the woman submit herself to the routine already prescribed by experienced educators as the fitting preparation for the duties the man is expected to perform. Many a young man drops from the ranks now; some young women would master the trial then; but this does not invalidate the warning.

A system of education, based on a sentimental theory, will secure some proselytes, some of whom will prove victims. Judiciously conducted, so that their physical development is provided for, there is no assignable limit to the education of the girls who may be found aspiring for the higher culture. The whole question of school hygiene is in abeyance to the social and home life. If their influence is toward developing the healthful vigor of the child, the conditions will be simplified under which the mental training of the child can proceed with regularity and fullness. The nearer boys and girls approach to a sound and symmetrically developed physical organization, the greater the similarity of conditions under which their mental culture can be conducted.

5th. The Purposes of the Higher Education defined by Structure.

There are no physiological obstructions in the way of woman bending her efforts to the acquisition of all the knowledge her time, inclination, opportunity and strength may permit. On the contrary, the hope of the future rests on the introduction of strong, well-trained and cultured women into the ranks now weakened by the presence of so many who are flac-

cid, purposeless and untrained. If she possesses the knowledge, and is disposed to use it in the competition of the male professions, a grievance is established so soon as she is denied the privilege. Time will test her ability and endurance.

Social science is working at the problem of furnishing the large surplus of female population with honorable and lucrative employment. The women and children are rescued first from the burning ship; they are allowed free exit from the besieged city. The chivalry of common sense agrees with the physiological denial that man and woman can meet the same issues on the same plane. The exceptional cases will wrest their own way to success.

It must be seen, however, that this does not meet the demands of the advanced controversy. Experience and the organic law, which are ready and willing to allow and provide for the exceptional cases, are confronted by argument to prove that experience is at fault, and that obedience to the physiological law is neither necessary nor advisable. Even the home, which is the keystone of the social order, must be abandoned, that the woman's equal physical, legal and intellectual franchise may be asserted.

The organic law; which is the expression of God's purpose, holds good nevertheless; unyielding against the assaults of fanaticism and the feverish restlessness of misdirected energy—neglect of duty near at hand for the possibilities that may never come, and which will prove unsatisfying if achieved.

The rational soul, temporarily abid-

ing in the material body, is dependent on that body for its knowledge of material things; and the distinction of sex, whose sole purpose is the continuance of the species, furnishes to the higher nature conceptions of duties whose fulfilment is needful for the highest spiritual development. Whatever an overwrought civilization may have produced in the way of a surplus female population, in straining the young away from duty to excess, in promoting celibacy and applying artificial checks to the increase in families, yet the woman's organization stamps her as the producer of the race, and the law of her organization tones her down to the endurance needful for the culture of her children.

"The system is organized when the effects which take place among the parts are *essential to one conception of the whole*; when the whole would not be a whole except these effects were produced; when the effects not only happen in fact, but are included in the idea of the object; when they are not only seen, but foreseen; not only expected, but intended; in short, when, instead of being causes and effects, they are *ends and means*."* What is true of other organizations is true of woman's; it is a means to an end. Her physical education should have direct, unswerving reference to the *purposes* of her organization; her spiritual education neither reaches its own best estate nor does it fill up the void in man's spiritual life, if it fails to meet and comprehend and

fulfil the emergencies of the organization given to its keeping.

The assumption of man's organization is that he shall fulfil his part in the increase and nurture of the race, and provide for its sustenance. The assumption of woman's organization is that she shall fulfil her part in the nurture and culture of her race, and be provided for. The higher education that inspires with other motives, or holds out incentives to women of an independent life, degrades the purposes of her organization, and does violence to her mind and body. Swift destruction follows on violation of natural law. Rome, in the opinion of the author of "Ecce Homo," died for want of men.

It follows, then, that the physical organization of woman does not limit the extent of her mental culture, but it apportions the bounds within which that culture is to be applied. School and college life are but the *beginnings* of those courses of study and application which fit men for the ordinary competition of professional life. Grant the extreme case, that some proportionate number of young women are annually to emerge from these or similar institutions; what then? If they are to proceed still farther, and continue the student's career, they may, and who will successfully interpose the barrier? But if so, the woman's organization is trampled under foot, for its highest functional activity would be a physiological protest against success.

If, in the strife of duty near at hand, there is the sense of inferior occupation, the oppression of monotonous

* Prof. Whewell. *History of Scientific Ideas*, 3d edition (1858), vol. 2, p. 240.

routine,* the sense of "perplexed disappointment, of baffled intelligence, of unoccupied powers, of blunted aspirations, or the consciousness of being fitted for something better than she is," let the woman hold herself responsible, and, by reform in social ways and by personal culture, release herself from the thralldom. Let it not be forgotten that the nearest duty is the urgent duty. It was with high wisdom that the preacher said to the graduating class, "Many men are troubled about what God meant them to do;

* "And now I think of it," says the schoolmaster, "I wonder if there be not in the lives of some women too much 'green pine;' if some husbands don't 'forget the kindling' all the way through." Mrs. Melendy said, that "light wood" would make the heavy wood go better. I wonder if a little "light wood" now and then in the shape of a pleasure trip, or of books, music, conveniences, sets of furs, pretty things in the house, or of an appreciative or commendatory word, would not make woman's heavy burden of work go better."—The Schoolmaster's Trunk, by Mrs. Diaz.

but, young gentlemen, my experience teaches me that God means very few of us to do anything in particular."

"If ennui is a summons to a real activity, as is so often the case both with men and women, she need not ask if she may properly obey it. Let her consider the lives of women who differed essentially from each other: Mrs. Somerville, for instance; Miss Austen, Mrs. Fry, Rosa Bonheur, Mme. De Staël, Florence Nightingale, Angelica Kaufmann, Maria Mitchell, Mrs. Stowe; 'if God have called any of you to explore truth or beauty, be bold, be firm, be true.' Only it must be always remembered that the dissatisfaction and the longing are not always the proofs of the power nor of the vocation."

